Statistical mechanical analysis of (1 + #infinity#) dimensional disordered systems

Skantzos, Nikolaos Stavrou

Relations in Architectural Space

Designs and Effects in Space of the Traditional Thai Houses and Temples

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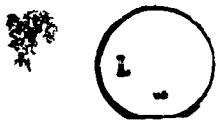

Abstract

What makes the space in a piece of architecture intelligible for us is the fundamental question of this thesis. Architects and users of buildings are the sources and the receptors of this intelligibility and therefore are the two points of view used in the research. There are many discussions and theories that focus on either the architects' or the users' concepts of architectural space but few focus on both and an even smaller proportion examine the relations between them. To this end, the thesis investigates the *relation* of intelligibility of space known by architects in the design process and the one that exists in the architectural reality known by the users of the buildings.

This thesis sees this *relation* as the connection between the abstraction and reality of architecture. It is proposed that this connection in space consists of four dimensions: structural, experiential, functional and architectural element dimensions which form different relations in different pieces of architecture in different socio-cultural contexts. In this way, the research relates abstract properties with their reality in built forms through on-site observation and participation in activities inside the selected buildings in Thailand. The analysis shows that some relations appear to be regularities in most architecture whilst others are specific to the twelve selected Thai houses and temples. These relations are realised in architectural space by both architects and users of the buildings therefore they are designs and effects which can be configured via three levels in a relation; that is, 1) inside each dimension, 2) between dimensions and 3) among relations of all dimensions.

It is in the third level that a *relation* represents a full description of the architectural reality in a space in the form of a relational syntax in which the design and effect of a space are simultaneously comprehended. Consequently, relational syntaxes become the instruments that can be seen and used as design strategies in the process of designing or analysing buildings. Through the analytical and descriptive characters of relational syntax, a deep understanding of architectural space is reached between the architects and the users; that is, the design is seen as the effects of the actual uses in buildings and vice versa.

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1. Introduction

The question about space is perhaps one of the most asked questions in the widest areas of knowledge, especially those that are concerned with physicality e.g. physics, geometry, engineering and architecture. This is because we are basically surrounded by two things: space and matter. In our conception of these, space is the more flexible and ambiguous. We can see trees, ground, sky etc. are made into parks, streets or horizon. In buildings, we see walls, columns, windows etc. but conceive space and apprehend it into various things, rooms, corridors, stairs etc. This research is ab ut architecture but it is not about what we can see or about what buildings look like. Instead, it is about what we cannot see: the space inside the built environment.

Space is both neutral and subjective; the philosopher's space seems to be different from the architect's space which is also different from many people's space. However, in reality (of our everyday life) we conceive space in similar ways especially when spaces are designed for specific purposes. For example, a staircase is for walking up and down and links two locations of moderate distance. The question of this research therefore focuses on architectural space which is the key to understand architecture. Only through use, not design, will space become architectural space and begins to be very ambiguous not only in how we use space but also, as a result, in how we design space.

Practically and theoretically, architectural space is often taken for granted as one substance in opposition to or in complement of its envelope. Here lies the problem of how a piece of architecture can be recognised as either a social or artistic object when it is both. 'Why do buildings designed for similar purposes look different or why are similar designs used differently in actual activities?' The answers to these questions lie in the relationship between people and architectural space as much as in the relations of spaces themselves. Generally, we can rely on our intuition in dealing with architectural space; that is, we seem able to find our way through buildings by following natural mechanisms of movement and perception, or as Bergson puts it 'memory' (1911). For many 20th century philosophers, this phenomenon is systematic and perhaps universal because space in philosophy is often seen in a purely abstract environment of cause and re ult at a conceptual level (e.g. Barthes, 1977;

Baudrillard, 1996; Bergson, 1911). This abstract level is necessary as it shapes general understanding about space as 'a priori' (Kant, 1929) telling us that we are able to act intelligently upon this abstraction or even begin to see it in a new way (Deleuze, 1993).

This is why, in the built environment, philosopher's space is important to architects (as they often cite philosophy). But their spaces are not the same because architecture is never built for just anybody wh se needs and conception are universal. As a social and artistic concept, architecture adds to pure space the socio-cultural aspects that convey different values to different people either in the forms of symbol or use (e.g. Cassirer, 1953; Lefebvre, 1991). In this way, the conceptual system and universal qualities of space become very complex as the reality sets in. However, the space which philosophers talk about, architects design and users move in is always the same which suggests complex relations among different approaches. The question addressed in this research is therefore twofold; it is both in concept and reality for architecture and any system in its space.

The twelve examples and one case study are selected to reflect the interaction of concept and reality in a specific socio-cultural environment. The traditional Thai houses and temples are widely regarded as one of the unique architectural designs (e.g. Izikowitz and Sorenson, 1982; Warren, 1989; Aasen, 1998) which emphasises space more than matter in its architecture (e.g. Jai'ongruk, 1975; Kalayamnamitr, 1977; Chareonsuphakul, 1984) In such designs, the relations between concept and reality could be very elusive and dynamic therefore an analytical view is needed toward many approaches to architectural space. Be it philosopher's, architects' or people's spaces, relations among them are influenced by the socio-cultural and artistic aspects which shape the ways architects design buildings

This research is about relations in architectural space which involve only the archit ct and the users of the building. At one end of the process, the architect approaches space (and takes care of its phil sophical aspects) at its conception while at the other end, the users of a building are in the architectural reality which is the end product of that conception. What happens in between is analytically vague for most of us but it has been perfectly intelligible to architects for a long time without much explanation. Therefore, intuition plays a great role for both architects and users in dealing with buildings except that it is rarely made clear how

how this intuition is achieved and furthermore synchronised. Explanations are often made either from abstract (e.g. Hillier and Hanson, 1984) or architectural approaches (e.g. Alexander, 1977) but not necessarily the relations between them. The design and use of space create a bi-directional dialogue inside a piece of architecture in which we give quantity and quality to space; that is, in space we recognise location, movement, utility and symbol.

We tend to divide our time into sections and our space into locations thus separating activities by means of physical differences in the environment. The recognition of location is spontaneously dealt with in use and intuitively in design before any other requirement, even before we actually move in the space. We realise that the location of and the amount of time spent doing an activity will differentiate our space into many pieces that fit together like a jigsaw. In this way, we understand buildings, as a whole or as parts, firstly by referring to locations of spaces or in terms of topology, which is shapeless, prior to any geometrical aspects of space. Every occupiable space has a topological property from the way it is connected to other spaces in the building. Similar to engineering designs of bridges or roofs structures etc. (Gordon, 1991), the structural understanding of how we design and use architectural space makes the whole building intelligible and not just scattering bits of space.

In the design process, architects often start from '*where*' they want you to start your intelligible journey through their imaginary buildings. They often try their hardest to 'construct' such a journey in order to sustain an intelligible picture of such a configuration of space so that its structure does not fall on your brain and cripple your movement; that is, the building makes sense in our social activities. Using methods such as activity or bubble diagrams, architects construct a building like engineers calculate the structure of roofs, walls, floors etc. With a little bit of help from philosophy, architects are able to finalise their 'structure' of space according to social needs and movement. However, it is very difficult to assess the strength of architects' structure in a straightforward way unlike engineers' structure, because architecture does not yield only to equations and matter. Hillier and Hanson (1984) proposed 'Space Syntax' theory that allows numerical assessment and comparison of a piece of space (they call it a 'convex space') in relation to every other spaces in a building. This process is done through a structure-like linear graph that differentiates spaces by their topological properties such as connections and locations in the sequence that

architects structure the designs of our houses, temples etc. This research acknowledges this topological abstraction as the structural dimension of architectural space.

When architects construct the structural dimension in each space of the buildings, they do so with the recognition of movement; that is, the next question architects ask is of '*how* can we move inside these spaces?' Naturally, we move through the spaces that lie in between the start and the end points of our activities. Based on our experience of being in buildings, most people would expect to walk through a doorway before getting into a building or along a corridor to go to a room, etc. The mechanism of our movement in architectural space therefore consists of three fundamental experiences: passage, junction and place (Suvanajata, 1994). One experiences 'passage' when moving in a space such as a corridor or experiences 'junction' when moving through a doorway or making a turn or experiences 'place' when moving in a room. With these experiences the users, not the architects, begin to deal with architectural space in an intelligible way; that is, we are able to predict and memorise the movement required to complete the journey and thus its whole architecture. In this way, architectural space also has the experiential dimension superimposed on its structural dimension allowing people to understand and even define space in relation to their bodies in a similar way to dancers in space (Laban, 1960).

Unlike dance, most of our movements in buildings are not for aesthetic but for functional reasons. A woman can make a graceful or dramatic entrance (Alexander, 1969) into a space provided that there is an appropriate function to receive such movement, e.g. a banquet hall or a foyer but it is less likely that she finds herself entering a storage or a toilet in this way. We all need appropriate functions for our movements which is why architects must ask the question of '*why*' the spaces are there. This is the recognition of utility that is spontaneously dealt with in parallel to the structural and experiential dimensions of architectural space. However, the ways people use spaces are not as universal as the ways they move in spaces because of different preferences in different societies and even families (Wood and Beck, 1994). As with the experiential dimension, on-site observation is needed in order to pinpoint the actual functions that take place in the space, at which point possibility of participating in the activities will verify the observations. Therefore, the data in this research represent the

actual activities in spaces more than what is described in plans. This property of architectural space is referred to as the functional dimension.

As with movement, functions need an appropriate object in order to communicate with us. We often quantify architecture by asking how many rooms there are in the building or give directions by saying that this or that function is in the 'hall' or 'room' at the end of the 'corridor' etc. At this stage of design, architects now ask the question of '*which*' objects signify the designated functions in a way that can be comprehended without difficulty (or having to deal with the philosophical side of it). Room, stairs, terrace etc. are the language that architects use to communicate to the users (Kahn, 1986) while they are often referred to as type in discussions among architects (Quatremere de Quincy, 1977). However, the research refers to this recognition of object as the architectural element dimension because it refers to the concept not the objects' appearance. Furthermore, the idea of element is linked to the designs (not of the elements themselves) and effects created by the way they are put together. Therefore, the dimension of architectural element refers to both the usual parts of buildings that we are familiar with in everyday activities and the self-referential property of these elements in design (Eisenman, 1979).

Even though the four dimensions of structure, experience, function and architectural element in architectural space are totally independent, they have not been clearly differentiated in most architectural discussions (e.g. in Farmer and Louw, 1993). Architecture tends to synchronise these dimensions since both architects and users deal with buildings in an intuitive way. The attempt at analytical discussions often fell into the idea of type (e.g. Franck and Schneekloth, 1994) or language (e.g. Alexander, 1977; Mitchell, 1990) both of which are aimed at architectural audiences. Furthermore, the discussions focus on 'matter' not 'space' or, when they do so, it is not clear how these two paradigms come about let alone how they relate. This leads to the most asked question, unfortunately for both architects and the rest, 'what is architecture?' The question is, however, the most discussed by theorists but it seems to be the scariest question for other people. The reason for ambiguity of the answer to this very simple question is the fact that the answer is bound to be highly subjective. In this way, architecture in reality continues to be a mysterious link between we the architects and we the users.

The approach for understanding architecture (as space and matter at the same time), therefore, must at first instance be analytical (Hillier, 1996). Secondly, the research proposes that the approach should be aimed at how architecture comes to be simultaneously recognised by designers and users as a multi-dimensional construction of a conceptual instrument which serves social activities and appreciation of cultural art. This does not answer what architecture is but informs us as to what it is made of and what it does; that is, the research approaches architecture as composite of structure-experience-function-architectural element and does so in an analytical way: from abstraction to architectural reality. This approach is done from the architect's point of view which starts from the structural dimension (theoretically, where architects begin their designs) toward the architectural element dimension (the one the users recognise as the buildings). Using existing buildings as examples, enables the analysis to be bi-directional in its approach since the information was collected on site by the researcher acting as the user of the buildings.

To answer the question of what architecture does for us, the research analyses the effects in spaces that are created by design and those that are the results of everyday activities. For example, there are many situations, as we shall see in the following chapters, where parts of a building are used differently to what the architects originally proposed, or, perhaps there are additional activities and movements in those spaces. Therefore, on-site observation is very important and fundamental to the research because the examples are seen as spatial configurations which are quantified as much by social activities (the way we use space) as by the topography of the buildings' parts. In this way, architecture is the end product of the bi-directional interaction between the act of design and the action of use but are approached at different ends by the architects and users:

Architects → structure-experience-function-architectural element ← Users

However, design of the architect often determines the evolution of these dimensions as well as the effects that we have to live by in architectural space. For example, to get to the chapel of a Thai temple from the outside, one has to pass through specific parts of that temple as designed by the architect. In most conventional temples, one will go through some sort of

gateway attached to the cloister before arriving on a terrace with sets of stairs leading into the chapel. In this way, space synchronises these dimensions into one understanding of a building either in parts or as a whole. Most buildings are designed as a whole and contain a few strategies in different proportions representing relations among these four dimensions in space. As a consequence of the emphasis on the multi-dimension concept of architectural space, this research therefore focuses on the relations between the structure-experience-function-architectural element dimensions as the means to fully clarify them firstly by understanding of how they work independently and then together as a whole.

In conclusion, firstly the research attempts to clarify the existence of these four dimensions in architectural space. Secondly, it attempts to show that there are systematic relations among them and it is proposed that the evolution of space into architecture is achieved through these relations. Finally, the research suggests that these relations can be seen as design strategies which can be used as an instrument to analyse existing buildings and as guidelines to accompany the design process. The research is initiated on these bases with the aim of arriving at a clearer concept of space through which designers and users of architecture can be more aware of, and share, an understanding of their roles in designing and using space and its properties. Furthermore, the research is carried out in a way that shows the potential of using the concept in design activity. Therefore, the research is structured in a similar way to a design project in that the study is allowed to evolve starting with structure-experience relations in the movement of people in space and concluding with the architectural reality of functions and architectural elements.

This research contains seven chapters. In chapter two, the philosophical background of the research is introduced through the works of 20th century philosophers whose investigations emphasise the importance of intuition in our recognition of space and the built environment. Starting from the most abstract, Bergson (1911) said that memory constructs our unconscious state of recognition in space, time and matter from which we develop our intuition. This idea is very abstract but necessary in order to understand the development of the concept of intuition which is essential when dealing with space and architecture. Bergson's philosophy has influenced many philosophers (e.g. Piaget, Deleuze) and architects (e.g. Eisenman, Lynn, Tschumi). The discussion continues by examining Cassirer's

philosophy (1953-57) showing how our intuition is developed further when put to use in our creations or defines our knowledge of things expressed in symbolic forms. The most recent philosophy discussed in chapter two and perhaps the most influential to contemporary architectural theories is Lefebvre's 'Production of Space' (1991). Lefebvre's philosophy acknowledges the significance of our intuition in institutional space, everyday activities in various societies and cultures down to the way we sit, move or make gestures.

Further discussion considers the structural dimension which, as mentioned earlier, draws the basic idea from the concept of spatial configuration in Hillier and Hanson's Space Syntax theory (1984). 'Intelligibility' of a spatial configuration is discussed in parallel to other structural approaches (Alexander, 1977; Mitchell 1990). The discussion of the experiential dimension is based on actual experience common to most buildings. For example 'passage' is commonly known as the space used to go from one place to another. Despite this common notion of movement, socio-cultural factors in each society usually fill in the details of social activities and how these influence movement (Lefebvre, 1991); these factors describe the functional dimension which provides meanings as the way that people know space. With this knowledge of the functional dimension, the means and the end of the design process are expressed in various architectural elements of room, stairs, corridor etc. which exist in space as well as in knowledge.

In chapter three, the research methodology is presented using a Thai Buddhist temple to illustrate the analytical process. The methodology consists of seven analyses starting from a convex space analysis of the building. A general understanding of a building is presented by describing its convex spaces in the simplest way; that is as open, connecting and enclosed spaces. However, connections and locations of convex spaces determine the structural dimension of a building by becoming a configuration that structures the way we move and how the building maintains its intelligible whole in the same way as a structure of, let's say, a roof maintains its form. The structure of convex spaces can be illustrated in the form of a justified graph (Hillier and Hanson, 1984) allowing the experiential dimension to be seen in relation to the structural dimension. In this 2nd analysis, we can now see how our experiences in movement structure the way we build while the structure-experience relations are discussed in the 3rd analysis, the theoretical analysis.

Based on Hillier, Hanson and Graham (1987), the syntactic analysis provides the data that link the abstraction in structure and experience to the reality of different functions and architectural elements analysed in the design analysis. The 6th analysis focuses on some important routes that are essential when using a building. Following the flow of these major movements, specific sequences of the important spaces in the building become more visible indicating the key points in the design of the whole building. Finally, the relation analysis presents all four dimensions in one string of relation in order to clarify the space-to-architecture process in different types of spaces and buildings. Significant relations (often those we find in interesting locations or that constitute powerful experiences of the buildings) will be discussed in depth as they seem to be the important strategies that architects employ in their designs which in turn characterise the way we use and understand our buildings.

Chapter four discusses the theory and background of the most fundamental built environments, temples and houses which are seen as fit to be the first examples of the investigation since they are the primary references for using and designing other types of architecture. The twelve examples are the masterpieces of traditional Thai architecture and represent mature design strategies. The selected buildings are also chosen from different periods in order to compare and discover the design principle behind conventional and contemporary Thai houses and temples. The examples were experienced first hand and are very familiar to the researcher. These Thai houses and temples have very open and flexible characters influenced by the structure of extended families and Buddhism. It is proposed that Thai architecture has a high degree of dynamism in its space and architectural elements. The analysis pinpoints the design strategies used to achieve these dynamic effects such as the capability to grow or contract with the size of the family in Thai houses or highly dynamic effects in plans and architectural elements of Thai temples. The discussion shows that dynamism has consistently been a major design principle of Thai architecture as the concept is used throughout, from planning to architectural features.

Chapters five and six show how dynamic qualities are achieved by using the research methodology outlined in chapter three. Chapter five focuses on the structural and

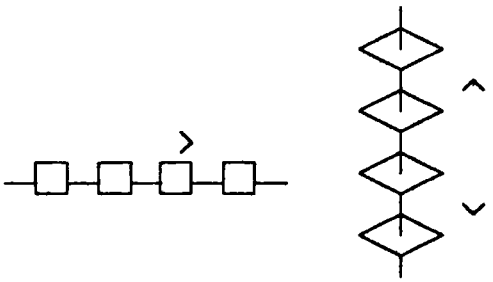
experiential dimensions of architectural space derived from organisation of convex spaces in architectural plans. A building is therefore seen as a system of connections between convex spaces which are classified into a-, b-, c- and d-type spaces using justified graphs (Hillier, 1996). These four types of convex spaces create the structural dimension of a building which has to be experienced in order to verify the structure itself in the same way as we have to actually build to be able to use the building. In general, the way we move in a building is fundamentally based on the architectural characters of space and our natural mechanism of movements; the experiences of linear movement (passage), of turning (junction) and of occupation (place) create the experiential dimension (Suvanajata, 1994).

We now have two dimensions and seven ways to describe convex spaces. Theoretically, 12 relations are therefore possible between these two abstract dimensions. There are some strong structure-experience relations, such as a-place, c-junction or d-passage relations that can be postulated as fundamental and generic to architectural space while the rest are less common in the selected examples. However, the significance of these relations is not only in numbers of occurrence but also in the ways they relate to others. In this way, a relation is an intrinsic property of a convex space that works with others in a syntactic way; that is, how it is understood in relation to the whole. Syntactic properties of space are basically the concept of a part-whole relationship between the target space and the whole spatial configuration. The integration and control values, space-link ratio (SLR) and based difference factor (BDF) are the syntactic values that allow comparative analyses both in the scale of a convex space and the whole spatial configuration (Hillier, Hanson and Graham, 1987). Syntactic analysis is therefore the link between the abstract discussion in chapter five and the architectural discussion in chapter six.

Chapter six contains three analyses: syntactic, design and route analyses which link concepts and effects to design. Structure-experience relations analysed in chapter five are now seen in their functional and architectural element dimensions using information from the on-site observations and actual participation in major activities which occur in the selected buildings. There are 42 and 30 functional-architectural element relations in the selected houses and temples, respectively. These relations are design properties that most people do not experience because a building is normally known in parts and not as a whole. In order to

understand the most common parts that characterise a building, the real time experience of walking and participating in the building is needed. Route analysis shows the routes that are most frequently used by the majority of people in the important parts of the buildings. Consequently, the four dimension relations in spaces on these routes seem to represent the reality of the building for most people and thus it is essential that architects focus their designs on these routes.

Chapter seven concludes the research with all the relations that are created in the spaces of the selected twelve buildings. However, not all relations discovered are always realised or important in understanding the buildings. The conclusion brings forth a few major relations which are seen as the basic syntax in design and use and thus the strongest discourses of the abstraction-to-architectural reality process. The most important aspect is how these major relational syntaxes are used as design strategies to create the building. The simultaneity inherited in the syntax means that one does not have to understand every element in the string of structure-experience-function-architectural element to be able to comprehend the architectural space, e.g. one does not require the knowledge of structural dimension to use the building. It is not the composite of different elements but rather is the relations among different values, or dimensions, superimposed on the same space. In this way, it is called relational syntax which may be interpreted as a structure that requires vertical reading.



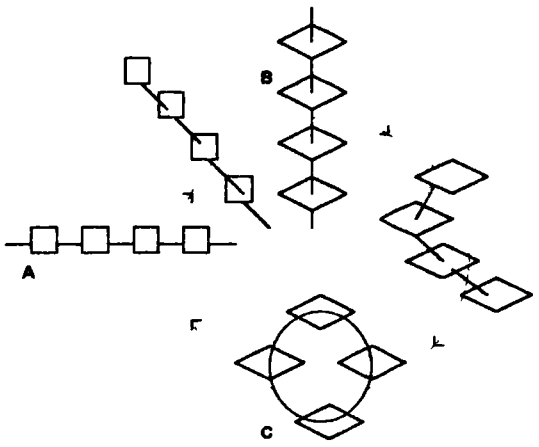
A.) One-directional linear structure e.g. language

B.) Bi-directional superimposed structure e.g. architectural space

Figure 1.1 Reading of architectural space and language

All four dimensions put together form the conception of syntax which is read as the process by which space evolves into architectural reality. The structure of the process, however, is

not linear in reality since all four dimensions simultaneously exist in relation to one another. The reality is therefore three-dimensional in which the elements of the relational syntax are laid side by side but on separate planes of knowledge (Figure 1.2).



A: reading → B: conception → C: reality

Figure 1.2 From abstraction to reality

In other words, one understands the whole as a result of the experience of moving around in parts of the building as required by how functions are structured and architectural elements are located. The research aims to explain this phenomenon clearly by taking spaces through the structure of this process. Through such an approach, the research also aims to raise a more comprehensive view of what architectural space is made of and presents the process in a sequence that corresponds to the way space is turned into architectural reality. As a result, relational syntaxes are discovered and some are shown to be more influential than others; they are in space by either conscious design strategies used by architects or spontaneously formed by social activities. Through these relations in architectural space, the research explains and gains a deeper understanding of architectural reality.

2. Literature Review

The central issue in the research is the process of the evolution of space as an abstract entity into space as an architectural reality. Abstraction lies in philosophical and theoretical approaches to space, while architectural reality is concerned with practical and materialistic approaches to the design and use of architecture. Despite the diverse origins of the ideas reviewed here, the approaches share the basic interest in three key areas: space, movement and social activities. The following discussion aims to show how the idea of the research has reached its present form by examining the ideas in the same sequence as that by which space is turned into architecture. The sequence of the discussion will start from the most fundamental aspect of space in philosophy and theory of architectural space. The discussion then moves on to look at socio-cultural aspects as these relate the abstract ideas found in philosophy and theory to real spatial experience focused on socio-cultural aspects of traditional Thai architecture.

The review is representative rather than exhaustive of the literature. Key literature will be discussed in detail, whilst related ideas will be cited in order to emphasise the specific argument of the research. The first section is the philosophical background of the research on the pre-structural aspects of space. The discussion adopts the position that people understand architectural space firstly through conception not perception of geometrical shapes in a limited subspace or bounded space, for example, in Nerlich's sense (Nerlich, 1976). Therefore, the framework for the discussion is about systems in our mind and intuition. In this respect, the idea is shape-free and topological. However, a space is given a tangible quality which is not a geometrical orientation but an idea of configuration in its structural dimension. As a result, topological space is topographically defined not by its physicality but by its socio-cultural concept. The idea of configuration plays a very important role starting from the so-called metaphysic philosophy to the idea of symbolic forms down to the way social activities are carried on in architectural space. In this way, the comprehension of space in architecture necessarily is a conceptual and configurational one, in both the architects' and users' terms.

The discussion of the pre-structural concepts of space focuses on the works of Henri Bergson (early 20th century), Ernst Cassirer (mid 20th century) and Henri Lefebvre (late 20th century). In Bergson's 'Matter and Memory' 1911), the idea of space, time, body and

movement is explained in relation to how people develop their concept of being in and using space in terms of memory and duration. As a continuation of ideas of movement and space into the symbolic aspects of form, Cassirer's 'The Philosophy of Symbolic Forms' (1953-57) has moved the concept of pure space and related it to people's concept of artefacts and built environment. The last key author is also the most contemporary. Lefebvre's 'The Production of Space (1991) narrows the discussion of space to its meanings in social life offering an excellent link between his predecessors' ideas of pure and conceptual space and the idea of the social aspects of space and thus moves space even closer to people.

The next section is an investigation into the concept of the interdependence among space, movement and social activities in the occupying space in architecture. The discussion focuses on the first element in the string of relations, the structural dimension. The specific idea called Space Syntax pioneered by Hillier and Hanson (1984) describes space through its configurational properties. It introduces the idea of a spatial relation that always refers to at least three portions of permeable spaces or convex spaces to make sense of social activities in the built environment. The ideas are major parts of the basic theoretical argument and analytical procedure of the research. Other related works such as Alexander's (1977) and Mitchell's (1990) are also discussed for their approaches to the structural aspects of architectural space.

The second element in the relational string, the experiential dimension, is the idea of space types first outlined in 'Instrument of Dynamism' (Suvanajata, 1994). As architectural spaces are structured in their own logic, they are also experienced in another independent dimension when people move in them. Naturally, most people share the same kinds of experience when in the same parts of architectural space during their social activities. The socio-cultural background of the discussed architectural spaces helps one to understand the experience people have when moving inside those spaces. Works on architectural and anthropological study of Thailand are discussed in this section. Among them are the works of Tambiah (1976), Kalayanamitr (1982), Jumsai (1988) and Waterson (1990). At this point, we begin to depart from the abstract side of architectural space and step into the physical side of it; that is the point at which functions and architectural elements are assigned to architectural spaces.

People may realise the idea of functions before they form an idea about architecture itself. Social activities create different types of function, for which we then create different parts of architecture to envelop them. Scholars like Rajadhon (1968), Tambiah (1969, 1976), Evans (1978), Csikszentmihalyi and Rochberg-Halton (1981) and Markus (1993) have conducted studies of how we can understand things or architectural space from the analysis of function/meaning they hold. More often than not, the understanding of function is confused with that of architecture, causing an analysis in architecture to be more difficult than it should be. Franck et.al (1994) attempted to classify space based on relations among forms, uses and meanings and then to establish types of space out of all those ingredients. At a first glance, this approach seems similar to the idea that this research tries to promote but there is a fundamental difference in the theoretical and applicational basis which is one of the reasons why the dimension of architectural element has to be seen and discussed independently.

The dimension of architectural element is at the end of the relational chain, if one begins with an analytical view of space. However, it is at the beginning of the relational chain if one takes a practical or user's view of space. In this way, this dimension is no less elusive and independent of space itself and thus requires an autonomous reading that differentiates it from its functional counterparts. Therefore, the discussion presumes an architect's view of design more than the users' views in using a building. Among the few architects who write, Eisenman is one of the most productive authors whose idea of objectivity of architecture (Eisenman e.g. 1963, 1980a, 1980b and 1987) is discussed in the review. Other architects such as Kiesler (1996), Venturi (1966), Kahn (1986) and Alexander (1977, 1979 and 1985) whose works and writings are concerned with objectivity in architectural elements are also discussed. Finally, the architectural elements of the traditional Thai concept are discussed in the works of Tambiah (1976) and Kalayanamitr (1982).

As concepts are developed into things, space is turned into architecture. Likewise, the concept of this research is to explore the potential of using ideas as instruments for analysis and eventually for design. The idea of the research has been influenced by many various sources and has developed a line of theoretical argument that attracts and respects specific parts f these literatures. It has to be made clear that the main aim of the review is not to make thorough analyses of all angles in the works cited. On the other

hand, the main idea of the review is to show how the idea of the research was developed in relation to the knowledge already in existence.

2.1 Pre-structural concepts of space

It is the discussion about movement of the body in space in relation to matter that first brought the research's interest to Bergson's philosophy. Bergson himself has been influenced by Berkeley and Descartes, he defines matter as *'...an aggregate of 'image'. And by 'image' we mean a certain existence which is more than that which the idealist calls a* representation, *but less than that which the realist calls a* thing, *an existence placed half-way between the 'thing' and the 'representation.'* (1911:vii). According to Bergson, the half-way point between 'thing' and 'representation' can be comprehended using common sense; it is intuition that Bergson refers to as he goes on. For Bergson, intuition can be used as a method. It has well-defined rules and offers a precise result (Delueze, 1988). This idea of intuition is related to the theoretical basis of the research in that understanding the use and experience of architecture requires a system of intuition developed through either cultural or institutional process into intelligibility in different dimensions of space.

The research tackles the question of relations in space which involves both internal properties and the external relation of each space to the whole spatial system. Intelligibility of space has to achieve both internal and external relations so that the space one is currently in is unique and thus makes the recognition of a piece of architecture a unique experience. The intelligible process in movement happens in the unconscious state; the awareness of the whole while being in the parts is the example given by Bergson. *'...when you speak of the town, of the street, of the other rooms in the house, of so many perceptions absent from your consciousness and yet given outside of it. They are not created as your consciousness receives them; they existed, then, in some sort; and since, by hypothesis, your consciousness did not apprehend them, how could they exist in themselves unless in the unconscious state?'* (1911:183). It is this unconscious state that represents the state of intuition in relation to intelligibility in space. To this point, the idea becomes the pre-structural aspect of space.

Bergson then goes on to discuss the relation of past and present; he wrote *'Practically we perceive only the past, the pure present being the invisible progress of the past gnawing into the future.'* (1911:194). General ideas of memory must be considered together with the

representation and resemblance characteristic of things in one's perception. With the overlapping of the past into the present, the resemblance and the individuals are perceived in the relationship of the whole and the parts; that is we perceive the resemblance, as the whole, before we perceive the individuals as the parts which are resembled. It is through the relations of parts to the whole that space can exist in one's experience. Bergson places much importance on the memory mechanism when explaining how space and matter exist in our experience. However, the research will not overemphasise this issue but rather refer to it as the link in Bergson's idea on the succession and sequence of parts that leads to a complete picture of the whole.

Bergson seems to have the idea of spatial configuration as he writes: *'A place could be absolutely distinguished from another place only by its quality or by its relation to the totality of space: so that space would become, on this hypothesis, either composed of heterogeneous parts or finite. But to finite space we should give another space as boundary, and beneath heterogeneous parts of space we should imagine an homogeneous space as its foundation: in both cases it is to homogeneous and indefinite space that we should necessarily return.'* (1911:256). It is this homogeneous and indefinite space or the whole that would carry the conceptual value for one's reading of a certain experience, of a piece of architecture. Heterogeneous parts or the finites thus become the idea of a series of configurational reading that through accumulation process in movement constructing three or even four dimensional experience of space and its envelope.

Bergson's philosophy sees space in its pure conceptual state free from any value-laden concept. Space is as natural as the body and its movement; it is in between thing and representation. In the conclusion part of Matter and Memory, Bergson confirms his belief in self-existing state of matter as *'My consciousness of matter is...not subjective, for it is in things rather than in me. It is not relative, because the relation between the 'phenomenon' and the 'thing' is not that of appearance to reality, but merely that of the part to the whole.'* (1911:306). Dealing with perception, which he believes to be the instrument of knowledge, Bergson elaborates the point of realising spatial experience through the consideration in matter and how we perceive it in space. *'It is true that, between this matter and this perception, scientific realism can find no point of contact, because it develops matter into homogeneous changes in space, while it contracts perception into un-extended sensations within consciousness.'* (1911:76). Architecture still has to be represented in a kind of geometry; the solution of the paradox of mere form and self-referential sign must be in the literal use of architectonic elements to deal with the

sources of intelligibility which lie in our perception and movement. Architecture needs to be here and there to verify the concept. It is here that we have to move beyond pure space to the idea of symbolic form.

In conclusion, the concept of relations in spatial dimensions brings out intelligibility from mere space and thus makes the concept of architecture exist in one's consciousness. In his critique of Bergson's philosophy, Piaget suggests that intelligence also resides in the development process of image not just in successive states in mind (Piaget, 1972). It is, in fact, the development of the continuing experience that people have in space that ties all those successive states of images together. From pure intuition in space to experience in space, we must discuss reality. Ernst Cassirer's 'The Philosophy of Symbolic Forms' (1953-1957) discusses space and experience in the light of human knowledge. For Cassirer, *'...the content of the concept of culture cannot be detached from the fundamental forms and directions of human activity: here "being" can be apprehended only in "action".'* (Cassirer, 1953:80). The research argues that it is necessary to differentiate between spatial dimensions in order to apprehend man-made spaces. It is here that our understanding of space, or even our appreciation of space, begins to project itself outward from pure intuition. It is projected and cast into the environment, into artificial experience that provides one with the understanding of use in relation to socio-cultural frameworks. As we build a specific-purpose building, the structural and experiential dimensions are fused together so that we are able to comprehend the 'being' of things with the 'action' of our movement.

The philosophy of Cassirer provides the necessary step from pure abstraction in Bergson's because, as he points out, it will release us from the oblivion of instrument (1957). A system of intuition will gradually turn into intelligibility in space through our action and experience in the environment. Cassirer acknowledges the importance of the part-whole relationship as he describes the internal logic of relations linking abstract ideas to physical attributes. *'The factor of "juxtaposition" as it appears in the form of* space, *the factor of succession as in the form of* time-*the combination of material properties in such a way that one is apprehended as a* "thing", *the other as an* "attribute", *or of successive events in such a way that the one appears as a cause of the other: all these are examples of such original types of relation.'* (1953:94). His argument can be compared to the idea of relational string of structure-experience-function-architectural element. It is the *juxtaposition* and *space* that provides both conceptual and actual structure to *time* which is apprehended through experience in

movement. Together with *material properties* in things, a *cause* represents function that comes with the way we built things; that is how we envelop those functions. This juxtaposition of different elements is uniquely composed in different cultures.

Cassirer, like Bergson, acknowledges the importance of configuration. They both agree that intuition is the key to understanding space. This research emphasises this idea of a system of intuition which is relational and dynamic and natural to our comprehension of space. Designers and users approach this intelligibility in space from different ends of spatial relation in reality. This relation is not clearly understood therefore making it clear and comprehensible from both ends is the aim of the research. To this point, Cassirer has pointed out that *'We intuit spatial* configurations *only by combining into* one *idea complete groups of sensory perceptions which naturally displace one another in immediate sensory experience, and on the other hand by diffusing this unity through the diversity of its particular components. It is only by this interplay of concentration and analysis that spatial consciousness is constructed. Form then appears as potential motion, while motion appears as potential form.'* (1953:100). Here, space becomes not only concept but also the mould of symbolic objects in a socio-cultural context.

It is seen as necessary to formalise space with specific frameworks as the research deals with architectural space. Cultural life transforms architectural space into two independent dimensions: functional and architectural-element dimensions. These two dimensions enable one to actually use and move in space and thus complete the process of abstraction-to-architectural reality. At this point, architecture has gained its balance between being conceptual and actual space. Further discussion focuses on how space is produced by human activities after its conceptual and actual aspects are fused together. We therefore move on to consider space as a ready-made object embedded with socio-cultural values in the discussion of Henri Lefebvre's work.

For Lefebvre, space is always loaded with social values. He also discusses the idea of spatial configuration and pictures it in human activity by using the term 'spatial practice' (1991). Spatial relations are conceived using firstly intuition and then, as space is culturalised or institutionalised, by way of intelligibility in spatial configuration. Once made for specific purposes by particular groups of users, space becomes even more relational both in its internal properties, structure-experience-function-architectural element, and its external properties, socio-cultural aspects of the particular groups who

use it. Lefebvre's argument is similar on this point, *'The theoretical error is to be content to see a space without conceiving of it, without concentrating discrete perceptions by means of a mental act, without assembling details into a whole 'reality', without apprehending contents in terms of their interrelationships within the containing forms.'* (1991:94). His arguments on space proceed from macro to micro level, from social space to gestures in different culture.

One thing to be careful about when analysing space is being too reductive in the analytical methods. In analysing space, as the research has proposed, the lived experience of the selected space cannot be neglected. One cannot fully understand the structure, function or architectural element of a building without connecting with the experiential side of such space. Social space, in particular, requires this experiential link through body movement and even more; that is to actually 'participate' in activities in space not just externally experience it. Lefebvre gives the example that one cannot predict the experience of Gothic churches from the experience of, for example, Romanesque churches. To this concern, a lived experience and observation is a necessary step in the research's concept. Furthermore, by actual experience and participation in space, the structural, functional and architectural elements dimensions become more distinct in their own terms as well as in their relations among one another, because it is only in this way that one can truly connect with their composite intelligibility.

Lefebvre proposes three general concepts for social space: form, structure and function. This view, however, is oriented towards perception and thus objectivises space rather than utilises it. To use space is to experience it in movement. When we move, the body forms its concept and presence over space and in this way the structural dimension can be linked to the utilisation in the functional dimension. In architecture, we conceive function and architectural elements in relation to the ways we move in configured spaces; without such experiences we cannot adjust or orient ourselves to the environment. The so-called structure would become more distant like when we look at a sculpture and we have to invent endless functions and elements each and every time we come across a new structure. This point makes clear that we cannot only depend on the quantitative side of body movement such as volume or frequency of movement in space but also the qualitative side of it as well such as types of experience and activities. With these two sides of body movement working together, we achieve what Lefebvre calls 'an intelligence of the body'.

This intelligence seems not to be in the forefront of our consciousness, as the configurational aspect is not the most obvious in a building however, it produces effects naturally and unceasingly in space. Therefore, when we use space,it automatically corresponds with this intelligence so that such space inherits and develops its intelligence in correspondence to the natural intelligence in body movements. That is why, to borrow the spider analogy from Lefebvre, a spider's horizontal-oriented body and people's vertical-oriented body create webs and erect vertical boundaries, respectively. Built environments, after all, in the pre-structural concept are the exercise and representation of the builder's body and its movement (Figure. 2.1). As people tend to form groups, so all buildings are made to serve more than one body and to accommodate many types of movement. Regardless of different types of movement and activities, buildings maintain the same basic intelligence recognisable to everybody using them.

Built environment has been created according to many constraints; most of the time in reference to 'lived experience' (1991:190). From the many types of built environment, the research focuses on the two most fundamental types: house and temple which are the most mature types of space known to people. In this way, they are suitable to be taken as the first type to be examined by the research's idea. It is unimportant whether people first created the house or temple. What is important is that they both fulfil very important functions in human society. The question of whether the house is influenced by the temple or vice versa is also insignificant. It is sufficient to conclude that they influence each other's existence and appearance. Looking back to the origin of man's social development, temples and houses are the most influential and thus the closest to our concept of everyday lives. We base our concept of space on the experiences we have in religious and domestic life and expand from there. (Raglan, 1964; Durkheim, 1915).

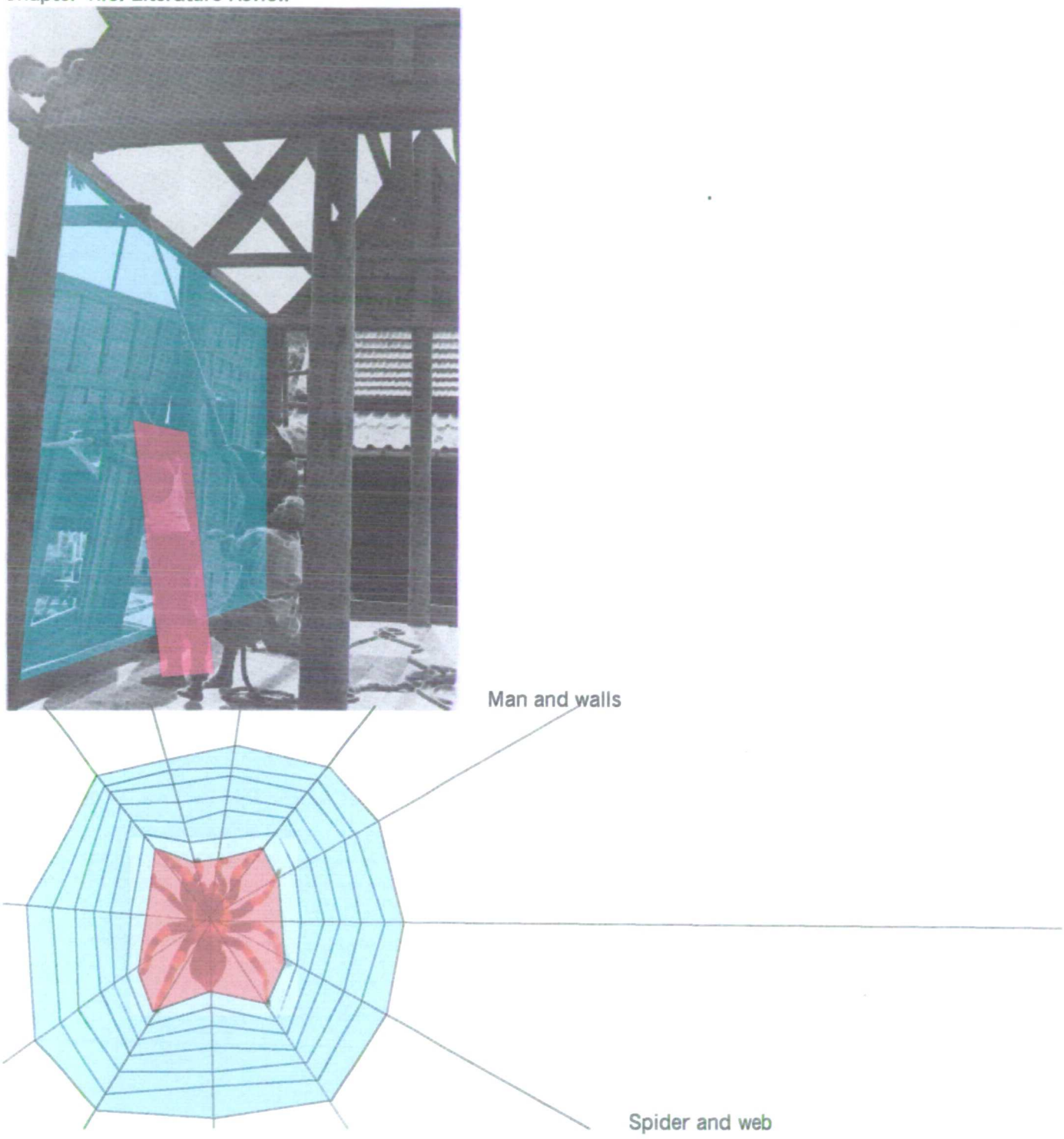


Figure 2.1 Body+Movement+Architecture

Along with the accounts of Bergson, Cassirer and Lefebvre which have influenced our concept of space in the 20th century, it has been argued that architectural space has to be conceived because it is relational and configurational. One uses intuition in order to appreciate the intelligibility in space, especially the more definite space inside architecture. Where do we go from here? Considering that space is 'read' and composed by our intuition in a sequential fashion, the research proposes the idea of a relational string of spatial dimensions, or relational syntax, that can be used as the theoretical basis for understanding and interpreting socio-cultural values and the design of architectural space. This relational syntax represents the bi-directional relation of the abstraction-to-architectural reality process. Further discussion is conducted alongside the dimensions presented in the relational syntax that is structure-experience-function-architectural element which is how abstraction is turned into architectural reality.

2.2 The Structural dimension of architectural space

Architects are acquainted with the idea of the beauty of the whole which arises from the 'right' treatment of all the parts. In fact, architecture is conceived as a whole and what lies behind its beauty is the synchronisation of all the dimensions. This synchronisation is relational and unique to each piece and type of architecture. It is a bi-directional relation that is 'there' and there is no before or after in the relation, only interaction. However, as the research proceeds from abstraction to architectural reality, an analytical approach is adopted and architectural space is seen firstly from its structural dimension.

The structural aspects of space were explored in the sciences, mathematics and geometry prior to architecture (Stevens, 1990). The idea of describing space in its structural sense has been one of the most favoured methods in architecture, though the idea is young compared to the idea of describing space as experience (e.g.: Rasmussen, 1962, Bachelard, 1964). Many architectural theorists have discussed architecture and its space in a so-called 'structural' way (e.g.: Alexander, 1977; Hillier and Hanson, 1984; Mitchell, 1990; Habraken, 1998). These authors imply either a combinatorial approach or a relational one when discussing space and architecture. Methodologically, there are few works that offer this approach to space (e.g.: Alexander, 1977, 1985; Hillier and Hanson, 1984). The word 'structure' refers to the idea of system and the specific idea and methodology used to analyse space that is known as 'Space Syntax' introduced in 'The

Social Logic of Space' (Hillier and Hanson, 1984). The idea of structure defined by Hillier and Hanson is essentially the idea of a configuration that creates intelligibility in space through a relational, not combinatorial process (Hillier, 1996).

Space Syntax theory describes each space in relation to its social structure that in turn makes any spatial configuration of built environment possible. Here the idea of intelligibility of space is achieved from the relation of parts and whole. The idea of convex spaces represents the idea of constitutive parts that make up the whole, spatial configuration (Hillier and Hanson, 1984). At a macro scale, the context of this system is social relations in which any other relations, in a micro scale, take place among at least three convex spaces. As the idea of spatial configuration is confined to human knowledge, the structural dimension of space has to be confined to the logic of intuition and intelligibility. Moreover, architectural space eventually has to make symbolic and functional sense for people when they use and move in a building. This fact automatically disqualifies many abstract configurations that do not fit into our intuition of being in architecture.

Because of the complexity of the relations among different properties of architecture, the idea of type is employed to identify elements in each relation. In 'The Logic of Architecture', Mitchell (1990) emphasises how different strategies using parts can contribute to a different concept of the whole. For Mitchell, the structural dimension of architectural space is made of relations under different rules and only those that make architectural sense. He classifies architecture as having different qualities in different paradigms: design world, real world and construction world, though they are all related to one another. The logic of columns, which are below beams, must support beams and so on, are put into relation using the structure of language. It serves the purpose of what Mitchell calls, 'depiction relation' of the intuition system in architecture (1990:64). However, it is the representative but not the representation of the structural dimension in architecture. The idea has, once again, fused abstract properties with concrete properties of architecture. Mitchell's attempt to understand architecture from its design process to the construction world shares the research's theoretical goal. His idea of using types to clarify relations is also useful and practical for conducting an analysis.

In this research, a complete understanding of architecture is achieved by practical application of intelligibility. It is not enough to understand how the system works without knowing how to put it to work. To start with, one of the ways, such as Mitchell's, is to use typology and give it a rule. Where does the rule come from? It either comes from the rule that is embedded in the nature of the types used or from the actual observation of events. *'In the environmental game, we must watch the game played, observe the live configurations, and deduce the rules. ...we may be wise not to ask agents acting in the built environment what they are doing, much less why.'* (Habraken, 1998:20). This may well be the best way to assess and analyse the structural dimension of a building, but it does not have a clear indicator in terms of spatial structure itself. Moreover, it might be vulnerable to the fusion of abstract properties with concrete properties of architecture. The research has adopted the analytical procedure of Space Syntax as the basis and indicator that will link, but not fuse, structural dimensions to other dimensions in relational syntax.

Before we move onto Space Syntax theory and procedure, another interesting idea is discussed in Christopher Alexander's works which concern with social activities and their relation to the structure of space (1977, 1979). Alexander calls this structure 'pattern' because he relates its concept with the idea of repeated events associated with both space and objects. By defining the structure of space in this way, it takes away the autonomy of space to be considered as something that has its own logic. The idea is so connected to many everyday activities that, instead of unlocking the relations among many dimensions embedded in space, architectural space becomes intuitively loaded with many similar things that are difficult to differentiate.

Alexander gives many examples of what he considers to be the generators of the patterns that happen in a building. They are, for example, walls, rooms, ceilings, doorhandles, terraces etc. These items definitely have effects on the space they are in, but the research proposes that these effects are conceived by people in different senses and are thus reacted to differently on different occasions. This is a vital point for consideration, as one relates to space either as a designer or a user, ultimately it is people's action and movement that verifies everything. As far as the research's concept is concerned, we need to be very clear about different dimensions in space. For example, the structural dimension has to be considered in its own terms; that is according to its topological properties, while the experiential dimension must be considered in terms of its actual

mechanism in space with people's actions and movements. This fact brings Space Syntax's theory on spatial configuration to the discussion.

Space Syntax is a theory that gives no importance to shapes only to configurations. *'We are convinced that it is unnecessary to specify shape in order to model real-world generative processes; indeed, that the concept of shape obscures the fundamental relational notions that underpin human spatial order.'* (Hillier and Hanson, 1984:xii). As a result every space is treated objectively as an equal. Space is quantified by its topographical characteristics which correspond to the topological concept of its containers; e.g. rooms, walls, lines of columns, stairs or furniture etc. A space defined by way of filling up its architectural surrounding has been called a convex space, which is the concept the research refers to when mentioning 'a space'. Automatically, every convex space has at least one convex space adjacent to it and becomes a system with its own logic. Furthermore, a linear graph can be drawn to illustrate all the connections among the building's convex spaces consisting of points and lines connecting all the points (Ore, 1963).

In a graph, points represent convex spaces while the lines connecting them represent real connections in space. Hillier and Hanson call this graph a justified graph which can be drawn for every building and normally its root represents exterior space. Every space is seen in relation to all spaces and has different integration values based on the nature of its relation, mostly in terms of location, to the whole graph. These values, together with other values, are numerical and can be calculated manually or by computer (Hillier, Hanson and Graham, 1987; Hanson, 1998). In a justified graph, points are connected to other points in different ways. According to Hillier, there are four types of space, differentiated by types of connection; they are a-b-c-d-type spaces. By definition, (Hillier, 1996) an a-type space has one connection to and from it, a b-type has two connections: one connection is from other spaces and the other is to an a-type space or isolated groups of sub-complex spaces. The other two space-types are more flexible; a c-type space has two connections or more and has to be a *part* of a ring (a complete roundabout of connected cells). A d-type space has three connections or more and has to be *on* the intersection point of at least two rings (Figure. 2.2).

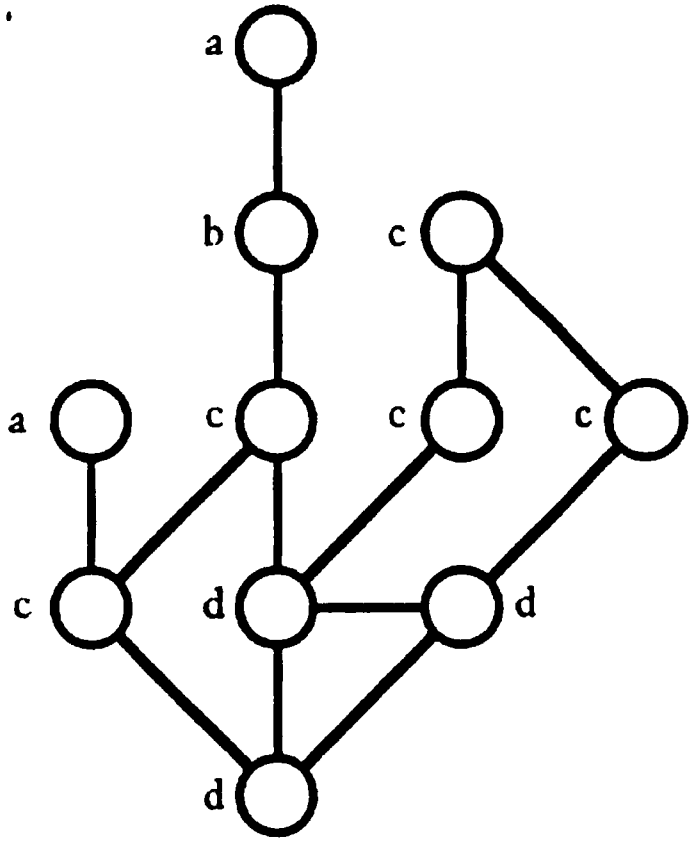


Figure 2.2 Hillier's structural types of space

With these concepts of pre-structural and structural dimension as a background, the research has established its theoretical and methodological frameworks for the proposed analysis using selected houses and temples from central Thailand. Analytically, the structural dimension starts the relation that makes the other dimensions possible. It is the basis for bodily movement in social activities to take place thus creating other meanings in architectural space. Architectural space gets its first definition here, because the concept is translated into configurations so that the intelligibility starts. The next step to architectural reality is to experience the structural dimension. This dimension also has its own logic and types and is sensitive to socio-cultural aspects in space.

2.3 The Experiential dimension of architectural space

Space has its qualities firstly because of its structural dimension; that is, as a member of a relation in a configuration. From its structural dimension, space outwardly generates other consequences. However, people conceive space from the other end of the process, from the most concrete end; that is, from their experience of architectural elements. Consequently, for them space has its qualities firstly because of its experiential dimension; that is, as a function in a form that they can move in or occupy in some way. As architectural space seems to acquire its qualities as a whole, people seem to know it as parts in their experience. While it is important that the structural dimension of space makes sense as a whole, the experiential dimension of space need only make sense of its parts. But it is also because of this interaction between these two ends of approach that architectural reality is made possible.

Space contains various experiences which are narrated as one moves about in space. When moving through spaces one interacts with them through movement and at the same time one learns about them through experience. Besides the configuration of spaces, one experiences architecture as the experience of being in the room, on the staircase, walking in the hallway, going through the doorway, looking out of the window, turning at the corner, etc. In the essay titled 'Spatial Narratives', Rakatansky wrote *'Architecture is permeated with narratives because it is constituted within a field of discourses and economies (formal, psychological, and ideological), to any one of which it cannot be reduced, from any one of which it cannot be removed.'* (Rakatansky, 1993:103). These aspects of 'field of discourses and economies' are the consequences that occur in architecture and are interpreted, as

proposed, in three simple types: passage, junction and place (Suvanajata, 1994) which are firmly associated with social activities inscribed in space. When asking about the experiences people have from being in architecture, they usually describe spaces according to their movement which is the consequence of being in and using a structured space. An excerpt from an observation at a state institution illustrates these three types of spatial experiences in relation to movement. The spatial types are inserted in parentheses next to the underlined words that suggest them.

"*I drive onto* (passage) *the grounds* (place) *of the state school* (place) *and proceed* (passage) *to the rear of the institution* (junction). *The grounds* (place) *are almost empty at this time of the evening, with the exception of a few people I see sitting in front of the buildings* (place) *on the way in* (junction). *After I park, I see a double line of people (at least 100) walking in the direction of* (passage) *the school building* (place) *from the women's side of the institution.* (place)...

I walk to (passage) *building 27* (place). *The small anteroom* (place) *is empty and dark. To the left* (junction) *of the door* (junction) *are several rows of benches* (place), *arranged in such a way that people could look out the windows* (junction) *of the room* (place).

The hallway (passage) *inside the building* (place) *is also empty, and relatively dark, ... I walk* (passage) *past* (junction) *the various offices* (places) *off* (junction) *the hallway* (passage): *speech and hearing, X-ray, and some others* (places). *They are all empty. I proceed to* (passage) *the stairway* (passage) *which is about three quarters of the way down* (passage) *the hall* (place).

As I reach (junction) *the stairway* (passage), *I begin to hear some muffed voices coming from the upper floors* (places). *The smell that I first noticed when I entered* (junction) *the building* (place) *becomes slightly stronger as I reach* (junction) *the stairs* (place).

I walk up the stairs (passage) ... *My footsteps echo as I walk the stairs* (passages). *Some of the voices become louder now, especially as I walk* (passage) *past* (junction) *the doors* (junctions) *which lead to* (passage) *the wards* (places) *on the various floors* (places). *Several windows* (junctions) *are open on* (junction) *the stairway* (passage); *some fresh air blows in as I pass* (passage) *them. ...I hear a loud scream as I near* (junction) *the fourth floor* (place). *It echoes through the stairway* (passage).

I get to (passage) *the fourth, and top floor* (places). *The door* (junction) *is open. A large cartoon wall*

painting is in the hall (place) *as I get to* (passage) *the top floor* (place). *It's about five feet long and three high* (place). ...*I turn right* (junction) *and walk to* (passage) *the central hallway* (place), *past* (junction) *the attendants' kitchen and the elevator* (places).

I look down to the left (passage) *as I reach* (junction) *the hallway* (place). *I can see an attendant at the dayroom door* (junction) *of the ward* (place) *adjacent to* (junction) *Ward 83* (place).

As I turn right (junction) *down the hall to get to* (passage) *Ward 83* (place), *I can hear the loud noise of the TV coming from* (passage) *the dayroom* (place). *The hall of 83* (place) *is empty now, as well as one of the dorms* (place) *at the end of* (junction) *the hall* (place). *The doors* (junction) *to the dayroom* (place) *are closed except for one* (junction) *half way down the hall* (passage).

As I get to (passage) *the dayroom door* (junction), *I see that all the residents are in the room* (place). ...*I along with the attendants and perhaps five or six residents, am sitting in front of the TV* (place), *which is attached to the wall about eight feet off the floor and out of the residents' reach* (place). ...*Bill stands up, goes over to* (passage) *the sink* (place), *and washes out his coffee cup. I do the same. We walk back to* (passage) *the dayroom* (place). *We had spent about 25 minutes in the kitchen* (place).

I decide to leave. ...*I wave goodbye to the other atten. and to some of the residents. I leave* (junction) *the room* (place). *I walk* (passage) *past* (junction) *the office* (place) *in the hall* (place). ...*I leave* (junction) *the ward and the building* (places).' (Taylor and Bogdan, 1984:246-257).

In such a simple experience, architecture clearly provides a structure for different individuals and creates different experiences as the consequence of being and moving in its space. The example is the experience of going into the building (the state institution) and going to the room, (the dayroom). We tend to use space and make social contacts through movement whereas architecture also enables the existence and characteristic of space through the movement that people make in their social activities. These simple types of experience make us understand space as the product of social activities simply by looking at our basic movements.

Movement to-and-from spaces = Passage

The first and the most straightforward experience is the *passage* representing the linearity of human movement that tends to create a horizontal volume of space. It is common to experience a passage in everyday life since it is a consequence of being connected with other spaces. As a result, most of the movement that happens in a passage is more global and dynamic in terms of the to-and-from relationship between spaces than the movement that happens in junctions and places. In architecture, spaces that offer such a quality of passage are translated into walkway, corridor, hallway, and staircase etc. Hillier suggests that this kind of movement involves in global properties of a spatial configuration (1996). It might, therefore, have high integration value, as we shall see in the analysis. Passage provides rich experiences of type, number, sequence, and location of architectural space with which it is associated. The experience becomes more interesting when taking into account the socio-cultural aspects of everyday activities.

Movement in-between spaces = Junction

Next, *junction* is usually attached to and is experienced by movement along a passage. There is always at least one junction in every occupiable space, in between two or more different spaces and is where activities or experiences change. Its physical and spatial properties are found where a movement exits one spatial context and enters another this means that most spaces can become junctions to other spaces. In comparison to passage, junction type is a much more condensed experience. The situation such as a pocket space of doorway, a group of columns or the planes of a wall or the drop of a ceiling define a change in space and thus the experience of junction. Physically, this is the point where movement is most integrated with architecture because it is the movement itself that cuts through parts of architecture, for example a doorway. It is not described as 'threshold' since junction is the concept of pure space and movement that a space has before gaining social function. The integration quality of this spatial type is expected to be in between those of passage and place. Its experiential quality, however, may be the highest of all three types considering that it always involves at least two out of three different types of space.

Movement in-a-space = Place

The experience of *place* completes our architectural experience and it is usually introduced by the junction type. Compared to the other two experiences, 'place' is the most static. It is the local convex movement that is usually connected with global linear movement or passage through junction. Place indicates a different scale of movement which is smaller than 'passage' but larger than 'junction'. The integration quality of place might be at the lower scale if it is an enclosed room. However, when place does not represent enclosed spaces such as rooms but common spaces such as halls or the *chan* of traditional Thai houses, it could become the most integrated as well as the richest experiential space.

In conclusion, a passage-type space is a space that suggests to and from movement in a form of architectural space used to connect at least two functions together, e.g. a corridor. A junction type-space suggests an in-between changing movement in a decision-making space which is a form of architectural space used to introduce the change of architectural conception of space, either in movement or function, e.g. a doorway. A place-type space is thus movement that can be seen as static compared to the former two types suggesting an occupying type of movement in a function-setting space in a form of architectural space used to signify a particular function, e.g. a room. These three types do not approach intelligibility in relation to the presence of every space in a building rather they approach it in relation to the sequence and presence of every involving space as people use and move in architecture. Any space can become a passage, a junction or a place in the sense that they are developed and established as consequences of actual activities that occur in space. These experiences are expressed through patterns of movement with or without architectural elements, in this way, convex spaces can sometimes be defined by social activities.

Having defined the theoretical concept of experiential types in space, attention turns toward the socio-cultural aspects of the experiential dimension of space, especially in Thai architecture. The concepts of Buddhism and a water-based civilisation are crucial to understanding Thai concepts of experience in space. As important as it is today, Buddhism has for centuries been the most influential factor in Thai culture and has been transformed into a socio-cultural aspect that forms the general habits of people. The philosophy of nirvana is to free oneself from material worlds and has been interpreted into many forms of visual substances from people's manners to the biggest built

environment. Naturally and consequently, the characteristics of Thai architecture correspond to the concepts of 'freedom', of the nation, and 'to be free' in Buddhism.

The concept of 'free' is expressed in the form and space of objects that have a high degree of 'dynamism', this refers to the flexible and adaptable characteristics of Thai architecture. Many aspects that help form an understanding of things are from considerations upon the nature and logic of parts and whole such as in this ancient concept: *'Considering this, all the maturity. How space depends on wood and depends on ivy, clay, and grass as its environment to succeed the state of Ruen* (building), *also considering this, all the maturity, is the same as how space depends on bones and depends on muscle, tendon, flesh, and skin as its environment to succeed the state of body, exactly the same.'* (Phra Sareebutr, around 543 BC)

The idea is of the built environment that has space as the main unit. Therefore, the presence of space is very much valued; space is confined even without physical boundaries. Space in Thai houses is differentiated using a minimum of architectural confinement such as changes of floor level substitute for walls. This philosophy of freedom also greatly influences the structure of Thai society and people's behaviour. This can be easily misunderstood and described as a society that has a 'loose structure' (Embree, 1950) whereas it would be more accurate to say that it has a flexible and dynamic structure. In Thai society, the sense of the individual is high, and people tend to comfort themselves in individualism in their behaviour. To illustrate this point in the environment of the western school of thought, it may be said that Thai society is based on the idea of *'Sentio ergo sum'* (I feel, therefore, I am) rather than the idea of *'Cognito ergo sum'* of Descartes (Suvanajata, 1973).

The world seen through this value offers a different man-environment 'interface'. This interface, or the representation of how the body, space and its envelopes interact among one another, forms people's experiential dimension of space. Jumsai has used the term 'Amphibious architecture' to illustrate the concept behind the works of architecture of many Southeast Asian countries (1988). He questions the similarities of houses in Mynmar, Thailand, Japan, China and Indonesia and concludes that even though houses in different countries look similar and might have the same origin, their spaces are experientially different. In fact, socio-cultural factors influence our understanding of the experiential dimension in that we match our movement to the spaces available with an

understanding of their particular rules and customs. This explains why there are certain amounts of different types of experience in total experience of different kinds of architecture. In the analysis part of this research, we will see in detail exactly how this idea is put to work, what the result is and how we can use the result to explain specific social phenomena including the act and process of design.

In his intensive study of Buddhism and the polity of Thailand, Tambiah analysed the origin of the concept of Thai politics and kingship and related the idea of 'Galactic Polity' to the ancient Indo-Tibetian tradition of the mandala. This argument raises interesting and genuine points concerning the origin of the spatial configurations of traditional Thai architecture. It suggests that the experiential dimension and even body movement can be collectively unified by one kind of intelligibility. The way people move and use space, at a micro scale, is exclusive to each society and leads to different realisations of objects. The religious and political ideas Tambiah investigated run parallel with the question asked by Lefebvre, *'Why do many oriental people live close to the ground, using low furniture and sitting on their heels? Why does the Western world, by contrast, have rigid, right-angled furniture which obliges people to assume constricted postures? And why do the dividing-lines between such attitudes or (unformulated) codes correspond exactly to religious and political frontiers?'* (Lefebvre, 1991:216). This, in turn, means that architecture's general orientation may act as the macrocosm, like religion or politics, shaping the pattern of movement (thus spatial experience) and is closely related to deep socio-cultural aspects.

Another author who has conducted a comprehensive study of architecture in Southeast Asia is Roxana Waterson (1990). Influenced by Bourdieu's work on the Berber house, Waterson proposes that houses are the dialectical relationships of people and things under customs and rules which are learnt in the same way as knowledge is gained from books. The relationship of socio-cultural aspects and the experiential dimension of architectural space influence each other a great deal and more so when this relationship is realised in the functional dimension of architectural space. In short, the experiential dimension is seen as the tool that obliges us to consider, and, in turn, in a mechanistic sense shape, socio-cultural aspects in order to assign uses and make sense of locations in architectural space in the functional dimension.

The experiential dimension of architectural space is, in its very idea, an anti-structural approach as in the Bergsonian sense of the indivisibility of movement. However, the idea of passage, junction and place type-spaces is structural in the sense that people experience spaces in sequence and move differently in each type. In this way together with socio-cultural aspects: rules, customs, rites and ritual etc., the transparency of space becomes translucent or solid enough for space to be differentiated according to those properties. Sometimes no physical boundaries are needed in order for some architectural spaces to be individualised. The idea of space types in the experiential dimension can be seen as the microcosm in architectural space of a whole building but it can also be seen as a macrocosm of movement if one considers the idea of gesture in Lefebvre's (1991) or Laban's works (1975). It also suggests the concept of Bergson and Cassirer about heterogeneous elements within the homogeneity of configured space.

The experiential dimension of space is the consequence that is produced by movement required by social activities. Architectural space is the structure whereas movement is its consequence and vice versa. Could these movements provide us with social information? Social information can be expressed through these consequences because *passage is where people normally move; junction is where people normally turn and place is where people normally meet.* These notions relate to how people behave in space and perhaps indicate the way in which space is used as the 'instrument' to carry on social activities. In this way, people walk through a corridor, turn at a doorway and meet in a room. The question of how people make use of the concept of their movements in architectural space in parallel to socio-cultural frameworks is realised and discussed next in the functional dimension analysis.

2.4 The Functional dimension of architectural space

A man-made object is known practically by its function. Function in its traditional meaning means utility which architects normally assign to space in different parts of a building. The research discusses function using its traditional meaning while considering socio-cultural aspects of the society in which a building is used as the instrument to understand the deeper meanings behind various utilities. The idea of function is one of the basic aspects of architecture since every architect must ask how the space will be used before proceeding to the design process. In this research, the idea of function in architecture is straightforward because its evidences come from real uses in active buildings. However, it is well worth looking at the background of the idea of function to establish our understanding of the simple ideas in architecture like circulation space, entrance, toilet, hall, bedroom etc. The review will look at the philosophical arguments about functionalism before discussing the works of specific scholars in the architectural field and in traditional Thai architecture.

Despite many definitions in different fields, functionalism is always related to the idea of structure and system. In philosophy and sociology, function implies the existence of some kinds of structure for it to take place. In architecture, functionalists may relate function to form as in the modern movement starting from Sullivan (1896) onwards. In this respect, functionalism is seen as post-symbolism for modern architecture. However, in traditional architecture functions seem to originate from and serve both everyday and symbolic activities. The utilisation of a system is at the heart of functionalism. In his attempt to define the philosophical basis of functionalism, Abrahamson emphasises the idea of the contribution of components to a system as a kind of internal relationship that defines the whole concept of functionalism. Apart from being related and affected by one another, *'The components of a system generally contribute positively to the continued operation of that system. It is the analysis of such contributions, or consequences, that are of primary concern. It is this emphasis upon contributions, which are defined as functions, that earned functionalism its name. ...'* (Abrahamson, 1978:5). The research uses a structural approach in order to classify data from space while interpreting and formulating this data into a theoretical argument via a functional approach. Architectural space is always a functional substance because a structure exists for a purpose or function.

This approach is especially true in this research through the on-site observations of the selected buildings in use. Without such a procedure, further understanding of the functional dimension of architectural space is almost impossible. It is what Abrahamson calls 'real knowledge' in structural theories that renders our conceptual understanding of space. Hillier's 'architectural possibility' also suggests this conceptual understanding in the design process *'...notion of function and their relation to form are also present in the designer's understanding of architectural possibility, at least in such a way as to support a formal conjecture which is at the same time a function prediction.'* (Hillier, 1996:426). In short, what function inculcates in space is the preliminary ground for our deeper understanding of space; for that is the way we know how to add socio-cultural meanings to our pure movement. Therefore, in comparison to the structural and experiential dimensions, the functional dimension is more straightforward and most of the time needs less explanation. One will understand it in terms of 'real knowledge' or 'architectural possibility'.

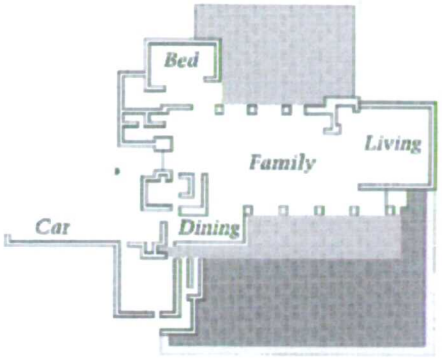
'The accepted view is that only through the perception and comparison of events repeatedly following in a uniform manner upon preceding appearances are we enabled to discover a rule according to which certain events always follow upon certain appearances, and that is the way in which we first led to construct for ourselves the concept of cause.' (Kant, 1929:223). Like Bergson, Cassirer and Lefebvre, Kant insists on the role of intuition as the tool to the understanding of space: its appearance and its message. It is argued here that, because of this fact, architects and users can synchronize their intentions or expectations when designing and using space in its functional dimension. For example, one would normally expect a certain function to be followed by or be next to a specific function as well as an appropriate 'room and orientation' for such a function. This is in addition to socio-cultural requirements that a piece of architecture is designed to serve; it is also the universal instinct between us and space 'in which we first led to construct for ourselves the concept of cause.'

This is why the preferences that are given to certain combinations, such as a dead end space, normally appear to be so and thus engineers our functions as such. This so-called Kantian 'rule' has formed the logic of seeing space as a kind of machine in which activities are facilitated. At this point of the review, each dimension discussed so far has been seen as a sub-concept in a big system of relations that started with pre-structural concepts of space. Mitchell's illustration of Frank Lloyd Wright's house plans demonstrate that design elements such as bedroom, hall, toilet, dining room etc. are

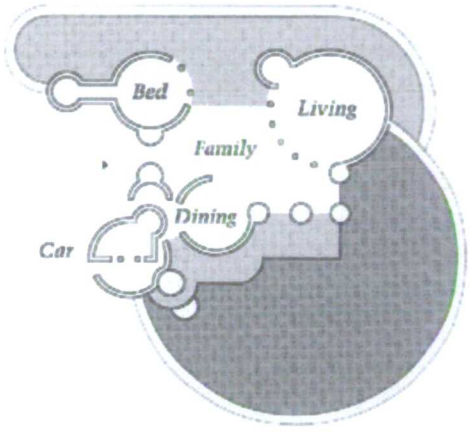
structurally and proportionally similar and yet maintain their unique characteristics because of their unique experiential dimension (Figure 2.3). In the first three-quarters of this century, functional aspects have been widely written about and referred to in the field of architectural criticism with the exceptions of a few architects (e.g. Keisler, Reitveld) during the avant-garde movement and in the late twentieth century (e.g. Gehry) who seem to emphasise the so-called dynamism aspects of architecture.

There are five different categories of function that have been investigated in twentieth century architectural criticism: structural articulation, physical, psychological, social and cultural-existential function (Ligo, 1974). These categories can be broadly divided into two paradigms: abstract and physical; that is, the idea is either seen from the subject/people's side or the object's side. The research attempts to make clear that in order to understand how architectural space works for our social needs one has to separate functions, how we use space, from their architectural elements. As we are approaching the twenty-first century this difference in function and its physical counterpart becomes even stronger than those in Ligo's discussion during the first eighty-years. Sullivan's notion that form follows function has been exhausted and criticised, even declared by some as a non-functionalism (Johnson, 1979). From the designers' rather than users' point of view, function must be seen as being in a different dimension independent from that of architectural elements. This leads to the idea of self-reference in object, suggested by architects such as Kiesler, Kahn, and Eisenman.

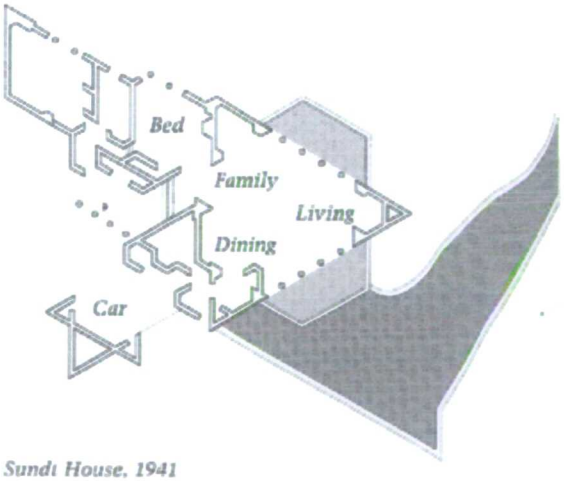
Body movement is recognised together with, if not prior to, the concretion of function types where architects and users arrive at the meeting point in their conception of space in architectural reality. *'Strict definition of human needs is the key question of architecture. Without definition of fundamental needs there can be only conglomerations of steel, stone, glass, and plastics, any excrement of industry-not architecture.'* (Kiesler, 1996:114). Kiesler does not suggest that form must follow function but that functions in architecture exist independently from what is holding them. People recognise functions together with forms; especially in buildings that have become institutional types. When one sees specific forms of temples or houses, for example step terraces or pitched roofs respectively, one automatically recognises the functions those buildings serve in the same way as how one learns to use the space of room or that of stairs. It is the reality of structure-experience and our body movement in various activities that form the functional dimension of architectural space.



Life House, 1938



Jester House, 1938



Sundt House, 1941

Figure 2.3 Frank Lloyd Wright's design (Mitchell, 1990)

The concern of body and space has changed from referring space to the dimension of the body to that of space in reference to 'what a body does' and less to the geometrical properties of the body. This is how the body turns its movement into function within architectural space. Lefebvre elaborates on Leibniz's argument about how space is linked to the body and its activities in order to describe how space is occupied, '*..., what Leibniz meant to say is that it is necessary for space to be* occupied. *What, then, occupies space? a body-not bodies in general, nor corporeality, but a specific body, a body capable of indicating direction by a gesture, of defining rotation by turning round, of demarcating and orienting space. Thus for Leibniz space is* absolutely relative...' (Lefebvre, 1990:168). The idea of the research concerning the functional dimension of architectural space is based on this notion of bodily movement together with socio-cultural requirements creating function in architecture.

Further discussion on the social aspects of function that are represented in the form of objects and space will follow. When one thinks about an object or specific space one usually thinks of the meaning related to it; that is, what one can do or associate with such an object or space. Thus function, in many cases, is known as the meaning of things when spelt out into reality, for example, a picture frame, a chair, a bedroom or a temple. In the analytical part of this research, a list of functions is used to describe different spaces in the selected buildings. Each function was determined not only by direct observations at each building but also by interviewing people using the buildings. It is quite clear that people relate what they conceive as functions to what objects or spaces mean to them in their activities. The close relationship between function and meaning suggests that in the functional dimension of architectural space we are dealing with both physical and psychological aspects of activities. In short, to be able to understand how a space functions one must be both observer and user.

Csikszenmihalyi and Rochberg-Halton believe that things acquire their meanings through the interaction of people's activities and the nature of things, as the cultivation process in culture (C&R, 1981). A piece of architecture, however, is more dynamic than a picture frame, a chair or any other household objects which are the subjects of the C&R study. It is more dynamic because it does not belong specifically to the user. Instead it acquires its meaning in a similar way to other objects. This means, as space, a piece of architecture belongs to the conceptual paradigm where everybody can comprehend similar understanding from, let's say, a bedroom. And it is at this level that the research discusses

the concept of the functional dimension. In actual buildings, the understanding of the cultivation process as described by C&R is helpful in determining how a space functions by observing objects and other treatments of such a space, and of course by learning about what the inhabitants think of their space.

The argument about whether our activities dominate buildings or buildings dominate our activities is not an issue since the initial intention of architecture is to 'design' movement in space using social activities as a reference. 'Dominate' does not mean 'shape' or 'force' when considering the effects of architecture on people; it does not rule over our patterns of living. It works as an instrument to be used in everyday life. We create architecture to be a 'loose structure' for everyday life, neither too free nor too rigid. The ones who know spaces as well as architects do are the inhabitants of such spaces, especially in domestic space. *'...because I like it here, and feel so good here in this house, because it suits me so well, I have suddenly realized that there are all sorts of other things to do, I can sit down and read a book, I can educate myself,...so it has changed me personally; it has changed my personal life, I feel more potent in myself, not in relation to society, but in relation to the small things I do everyday,...'* (Jose in Alexander, 1985:311). Jose is surely happy about what is inside a space in his house from the way he describes its space. It seems that what the space offers him is a specific relationship of how he can move and what he can do in it which means that he feels happy with the relation that the structural dimension has with the experiential dimension in this particular way. This way of linking the structural and experiential dimensions together is the functional dimension.

It is proposed that, like the structural and experiential dimensions, the functional dimension has a limited number of types to describe its variety due to the limited type in architecture and human activities. It is also argued that some could be hierarchically described by primary generic functions such as 'eating place', which could cover restaurant, canteen, cafeteria etc. In the discussion between Lawrence and Markus (Franck and Schneekloth, 1994), 'eating place' is referred to as a type of building. It is here that the problems begin. In fact, this classification causes confusion because they are not all classified in the functional dimension. For example, 'eating places' fall into the level of functional dimension while restaurant, canteen and cafeteria are all realised and differentiated in the architectural-element dimension. This is because one only differentiates those types by appearance not by social activities. If we think about the

concept of an eating place as a social activity, we can see that a dining room, for example, is also one of the same kinds. We must be careful not to mix these two dimensions because they will suppress the comprehension of each other's existence, imagine having home, hotel, hospital and prison in the same category of 'sleeping place'.

Consequently, the question is asked whether it is useful to define type or function in this way. The research proposes that one may look at space in a more analytic and fundamental way as having different independent dimensions. As a result, the function of each space in the selected examples is defined as simply as possible and in respect of its basic socio-cultural value, in most cases in respect of how people actually use space. For example, while Franck considers other subtle meanings of a doorway and gives different types to them, it is not the case for this research. *'..., any opening in a wall that accommodates the passage of a human body may be understood to be for entry or exit in any culture. Its meaning as 'doorway', conveyed by its form attributes, is universal. In contrast, the door to a church will carry additional meanings beyond generic entry and exit...'* (Franck and Schneekloth, 1994:346).

This is not seen as such in this research because 'doorway' is an architectural element. It is an object that is fitted to the wall of a building and is used as a universal instrument for the purpose of entry and exit which designates both the function of 'going in' and 'going out' from one space to another. Considering the nature of movement this space serves, it is thus described as 'circulation' in its functional dimension. A gateway, unlike a doorway, stands out from the wall of a building and is a special object that acquires an independent purpose. What it is used for is universally known as an architectural element marking a special location. In one direction, one goes out from space outside 'into' a specially marked space while in the other direction one also goes out from a specially marked space 'into' space outside. This activity suggests the function of an 'entrance' point in space for both directions. And because of its strong and special characteristic of demarcation, 'gateway' is, therefore, specified as 'entrance' in its functional dimension. In other words, the functional dimension, like the structural and experiential dimensions, is consistent in every kind of architecture.

At a certain point, we can see that specifying a function is down to an understanding of words. But if we want to understand the role of different functions and their significance in a building, we have to go beyond the name or label they have. Markus puts this

argument in terms of power and control (Markus, 1993, Franck and Schneekloth, 1994) *'..., we deduce function from all kinds of material clues: the form, spatial structure, and location of an entire building, or any one of its spaces, the furniture, content, or equipment in a space, or the inscriptions on buildings or room doors.'* (1994:151). In this way, a function is equal to the meaning of any household object in Csikszentmihalyi and Rochberg Halton's sense (1981). But a function can affect the system much more than an object can. This effect could be either physical or psychological depending on the nature of each function and also on the selected mechanism of activities in the building.

Let us look at some specific functions in order to see how we can work out their hidden significance by looking at what they do and where they are in the system. In one case, we have a rector's office in a school at the deepest location. Institutionally, it may be the most powerful place but this does not mean that it is also the most powerful space. It is true that such a space 'signifies' power but practically it is often preserved in appendix-like parts of the architectural space as a whole. Architecturally, a rector's office is a simple room where some paperwork and meetings occur while the main hall of a school is the real 'authoritative' space in terms of its significance in the existence of an architectural object. Since the main hall is usually either voluminously or symbolically a big space for gathering, one usually relates one's basic movement and conception towards such an item. And yet, the most important or 'sacred' space in a school is not the main hall; it is the classroom space. This is the space that represents the concept of school as a functional object, an object with a purpose, which is different from that of school as an architectural object with a big centralised hall,etc.

The next case, parallel to Markus's examples (Franck and Schneekloth, 1994), is a cell in places such as a hospital, asylum or prison. In such institutions, those who are put in the deepest spaces are usually the least powerful, not like the rector in the previous example. A cell is a very simple architectural element but as a whole they acquire the most important function in a building in the same way as classrooms do. Hospitals, asylums or prisons are all mainly designed to function best in relation to patients', homeless' or prisoners' cells. Doctors, nurses or officers actually work to serve those who are in these cells and wards. The reversal of power to the so-called 'captives' function from the so-called 'authorities' function is clear and is very influential in the design process. In short, the most powerful function is inferior in terms of its location in the structure while spaces

like surveillance towers usually have the best location in the building but may not be the most integrated space with other functions. However, the surveillance towers or nurses stations are the reference elements from which people in a building usually orient themselves. Moreover, the most 'sacred' space is obviously not the cells suggesting that in this case the most powerful function is not the most important architectural element.

'If meaning in buildings is about relations one should expect to find it in three kinds – between people, between people and knowledge and between people and things.' (Markus, 1993:39). The functional dimension is seen as the meaning that a building conveys to people in forms of knowledge which people conceive through their uses of space. In his discussion of experiences when using buildings, Markus emphasises the need for some kind of generic framework and suggests that it is the idea of type. Certain types of function are thought to be unique to certain types of buildings while inevitably some are universal. For example, houses and temples share many types of function in their spaces despite being totally different in their physicality. Of course, their differences create some special functions that signify their own places in the realm of architecture. Looking at space and building in their functional dimension, it appears that only a few differences actually exist among different types of building. Furthermore, the research proposes that the generic types of relations among different dimensions exist and have a practical logic which is very useful for analysing and designing architectural space.

Thai houses and temples share common social functions such as being meeting places and sacred places for special ceremonies. The Buddhist and Hindu cosmological rules create the primary criteria for both the functional and architectural-element dimensions (Kalayanamitr, 1982). Like traditional architecture everywhere, functionalism in the Thai case is not a million miles away from symbolism. Analytically, one must be unbiased about the fact that these two concepts are co-habitable in almost every space in a building under the philosophy of 'both-and' rather than 'either-or'. For example where functional arrangement is concerned, a Thai house always has a high degree of functional flexibility and openness because it contains a large multi-functional area or *chan* suggesting that the house is not designed to be a hard edge between public and private, as Waterson pointed out in other Southeast Asian houses (1990).

Segmentation, gender and power are also sources that influence the functional dimension in architectural space (e.g. Kent, 1990; Waterson, 1990; Markus, 1993; Carsten, 1995). In a Thai house, functions such as a daughters' new living units are located in respect to the parent's living unit (Pirom, 1979). The house branches out from the basic parental units in a tree-like form which represents the family structure (Thomsen, 1982). However, strict segmentation and gender has not been an important issue in the conception of function in Thai houses. The use of multi-level floors and terraces also affects functional organisation and zone distribution in both houses and temples (Rajadhon, 1944; Jaijongruk, 1975). Tambiah suggests that there is a set of socio-cultural rules (in language or even domestic animals) that assign certain functions to certain locations (1969) and later he analyses the influence of the politics and cosmology, or mandala, on social life in Southeast Asia (1976). In fact, this concept of mandala might be the origin of the planning concept of Thai houses and temples where the concept is visible in architectural elements before transcending its symbolism into functions.

We can deduce, for example, from the structure of a spatial configuration the influence or power of a function and see what kind of structure it has or is suitable for. Structurally, a space could have a very powerful location and yet be experientially poor because of its inappropriate function and vice versa. It seems that there is no one way of looking at things; it lies not only in one of these dimensions but in the relations among these dimensions. In the following section, we will take a closer look at the most tangible dimension which is also as elusive as space itself. The architectural element dimension of architectural space simultaneously leads an autonomous life as an artistic object and as a social object.

2.5 The Architectural-element dimension of architectural space

This dimension is the final transformation of abstraction in ideas into things as well as the first step towards architectural space. It is argued here that apart from socio-cultural meanings, architectural elements carry with them their own logic by which space gains its artistic quality in parallel with its social quality. The research emphasises that there must be a clear-cut understanding of the dimension of architectural elements that is different from that of the functional and other dimensions. Firstly, the review will look at the architectural elements in their own terms. The sources are from multi-disciplinary fields, although with a similar quest for something more than a mere functional space or object. Secondly, this approach to architectural elements will be discussed in terms of its relation to other dimensions. For practical reasons, the review will also discuss the examples both in general terms and specifically in Thai architecture.

The realisation of different architectural elements is not as straightforward as that of functions, at least for people who use buildings but do not design them. Like function, experience and structure, architectural elements are concepts, but the dimension is different from others because it exists in both our knowledge and in objects. Therefore, the discussion of architectural elements involves the issues of design and real situations in actual buildings based on architects' rather than users' view. For example, doorways or gateways are not discussed because of how they function but what they are, and in what way simple items: room, hall, doorway, window etc., relate to one another. In other words, the discussion is about architectural elements as tools used in design strategies in order to achieve pure architectural effects in space. As always, no matter how independent they are as objects, these architectural elements are sensitive to other dimensions as they are sub-concepts within a whole concept of relations.

Like space, the logic of architectural elements used to create a piece of architecture is a configurational one or the part-whole concept. To understand the whole, each and every architectural element must be understood that they are there to portray a configuration of a specific system which, like experience, is unique in each piece of architecture. In this way, we then return to the concept of the intelligibility of architecture and the idea of a self-referential sign which has been the main interest in Eisenman's works. As a counter - postmodernism, Eisenman proposed the idea of a 'better' object which is able to 'speak

for itself' (Eisenman, 1980, 1984 a, b). In his 'Towards an understanding of form in architecture' essay (1963), Eisenman is concerned with the relation of the transitional parts and the establishment of the whole, to which end he used the word 'future pattern' as the means to indicate the intelligibility of form. The issue of generic and specific form was raised using the concept of a temple.

temple = gathering-place-for-large-groups-of-people

|

|

a large space with a roof over it

This is said to describe only a generic form because of its lack of symbolic function while:

temple = focal-point-of-the-worship-of-the-community

|

|

(a specific form)

A specific form then is first considered as the attachment of symbolic function, but there again, if we consider its working function, a specific form could be imagined with a range of architectural elements that contribute to its conceptual whole. Self-reference/Self-existing is the interaction between 'message' and 'meaning'. The idea of becoming independent from messages that already mean something and acquire the immediate meaning as-is, would characterise the intelligibility of an architectural element in the sense that it becomes a 'being' and detaches itself from the functional dimension. In this research, a room is detached from what it serves and becomes one of the devices that is used, together with other elements, to achieve pure architectural effects. However, design strategies, are not expected to be independent but relational and sensitive to all independent dimensions of architectural space and may even have a fixed syntax for the effects they want.

It is usually not enough to only understand the structure in order to appreciate the rest of the meaning of something like architecture. For Eisenman, forms or architectural elements are for the purpose of indication not poetic content (1984 a, 1990). The process

of recognition and intelligibility deals with decidability and it may be said that this is one version of intuition. Architecture becomes more like a text in the sense that it can be understood through the system of self-referential signs in architectural elements. Then, the question is not about looking good or bad, colour or touch; an object and space are independent from their traditional properties. So, it is what is 'becoming' to one's understanding that is important; it is what Bergson calls a 'virtual object' (Bergson, 1911).

What Eisenman proposes in his examples of a word like 'c-a-t' is that it could also be understood as a-c-t is about the negation of the preoccupied value of sign in architecture using language as the metaphor. He suggests that architecture should be as transparent to the value-laden elements as possible, like the text which is capable of transparent transformation, i.e. c-a-t or a-c-t then cactis (cat is +act is) (1987). It is through the idea of language that Eisenman conceived his idea and because it is the nature of language to be either opaque or transparent; this is very useful when thinking about architecture. To be free from the concept of the value-laden object, one needs to approach architecture 'as-is' and be open to what architectural elements have to offer to one's experience; that is, to appreciate object and space in their immanence.

'If you change the letters around from c-a-t to a-c-t, they are the same letters, but now it does not mean a four legged animal. It means something else. So there is a fixed relationship between that particular fixed structure to an object.' (Eisenman, 1987:18). How about other combinations or structures; are they going to make sense of architecture? Are they going to be just mutated objects? As long as one proceeds with the practical framework of occupying space when working with structures, the answer to these questions is likely to be a positive one. However, this way of looking at each element of a system needs further analysis concerning how each element relates to each other. In language, each word contains purely abstract elements while in a piece of architecture each element has its own interiority and usually connects to others in specific ways in order to make the whole, and all of the elements involved, occupiable (Kewin, 1994). These elements are independent from the constraints of other dimensions and exist in their own logic.

The role of architecture as an artistic object seems to work subtlety behind its functional aspects. Its configurational quality is still very much intertwined with design technique and strategy. Unlike the structural dimension, the architectural element dimension does

not carry social information in its formation and thus often relates to people's movement more than activities. In this way, the logic of architectural elements has often been compared with music or dance for its rhythmic and ephemeral quality. Architectural elements themselves are sometimes compared with the body in order to express their ability to enhance or surpass traditional architectural functions (see e.g. Kiesler, 1996)

The concept of instrumentality makes architectural elements exist independently from other dimensions. This is a new symbolism with different aims from that which relates architectural elements to something else. Instead architectural elements are related to the architectural performance of objects, which is different from the mechanical performance of objects. This idea seems to be quite strong in so-called portable architecture which in many ways describes the root and characteristics of traditional Thai architecture. In this research, architectural elements are seen first in their most basic definitions like room, doorway, window etc. and second in their special definitions that differentiate corridor from cloister or veranda from terrace for example. These terms represent architectural elements by their architectural performances, which can then be related to design strategies that grasp those elements by their sense of instrument.

In contemporary culture, people increasingly tend to see space, activity, function and architectural elements as separate identities. What people do and what architecture does become less and less attached to each other.

'...We lay in each other's arms.
But the room is just an empty space.
I guess we've lived it out...' (Bowie and Gabrels, 1999)

Space and architecture can only start anew when we detach our understanding of function from what we think its container should look like or, when we have explored all our possibilities and 'lived it out'. Either way, structures or architectural elements will resume their neutral states because *'Human activity is never actually structured by space. In structuring space by physical objects we suggest possibilities by eliminating others. But the spaces in the interstices of physical forms are still 'open'. Within these limits, the infinite structurability of space still prevails. In our cells we may dance.'* (Hillier, 1996:345). The possibilities we adopt when we structure space are design strategies. Apart from generating possibilities from the abstract side of architectural elements as Eisenman does, there is another way that seems to base its strategies on 'rules' deriving from observations.

The most distinct one may be Alexander's series (e.g. 1969, 1977, 1979, 1986 . For Alexander, there is a definite rule, given to us by our culture that comprises a series of events that keep repeating themselves into patterns (1979). Alexander's approach is mainly based on observations, intuition and sometimes common sense concerning people's activities in order to deduce what he calls patterns of events (1969). 'Pattern language' was the next idea along this line of thought (1977, 1979). Finally, the idea was put into practice with a housing project that let people put their houses together by themselves using the sets of language provided (1986). In the structural dimension, we have discussed Alexander's idea of spatial structure. The review will now look at his idea concerning architectural elements which, in fact, plays the central role in Alexander's proposal. Looking at the ways people behave toward different architectural elements, a 'recipe' is suggested for each element when constructing a building.

'The elements are not just dead pieces of architecture and building-each one has an entire life associated with it. The names of the elements make us imagine and remember what people are doing in those elements,...' (Alexander, 1979:72). This approach is a useful and complementary concept to the idea of a self-referential object. It is because architecture needs to balance its existence as a social and artistic object. In this research, we see an architectural element described as a 'room' because it has definite geometry and is permeable by natural movement. It is equally important that a 'room' must hold a concept of being suitable for people's activities. In this way, a room already has a few threads of transparent relations from and to other dimensions plugged into it. In short, it is the relational quality of many dimensions that really forms an architectural element. Having had an architectural element put here or there in a piece of architecture verifies a decision that takes account of all the dimensions. Every time architecture is the materialisation of the abstract. It is always more than putting together a few value-laden elements, and letting their preconception of what they are and what they can do create the final scheme.

Venturi emphasises the double-functioning role of an architectural element as one of the unique principles of modern architecture which prefers flexibility (1966). However, flexibility in architectural element brings complexity and contradiction to a piece of architecture as a whole. Venturi gives the example of a stair designed by Frank Furness as the meeting point of basic and symbolic qualities in an architectural element. Alexander

has a similar concern; *'Changes of level play a crucial role at many moments during social gatherings; they provide special places to sit, a place where a woman can make a graceful or dramatic entrance, a place from which to speak, a place from which to look at other people while also being seen, a place which increases face to face contact when many people are together.'* (1969:136). However, the research sees this phenomenon as the production of space through time and not as a prescription or means of either analytical or design process. It is, of course, possible to insert such a purpose into an architectural element before hand but it seems to stretch the tolerance of people's conception of architectural space towards an even more complex and contradictory one. Basing design on such impressions seems premature and must be used with caution since such a ceremonial purpose is highly institutional, not architectural.

Alexander's proposal to make a staircase more important and increase its sense of stage is a convincing one. However, we cannot stop at this level of the idea. Elaboration of the idea is needed as well as sophistication in design. It seems to be true that in many cases, stairs space generates many interesting situations in people's activities. But first and foremost, stairs must function as 'stairs' in a functional and practical sense. Looking in detail, if we want to create new effects for stairs, the first thing is to make it qualify in its functional dimension of being a 'circulation' space that people can move in, as a passage from one place to another. Secondly, it must 'look' and signify its type as stairs, however, this is easy and universal. From this point, other qualifications can be added.

Very often, we find stairs are crowded with people talking and meeting there; this is not always negative but most of the time this situation should be avoided. It could be the result of other unsuitable elements in other parts of the design such as lack of space for gathering or wrong positioning of the stairs in the building. There are many good reasons to believe that a good pocket space with trees in a building will be more a favourable meeting place instead of a staircase. Besides, we can make it to be a stage-like place if we really want to. The microcosm of movement in space is seen as an explanation of this problem rather than looking at it in macro scale. We might want to look more closely at the mechanical, psychological, geometrical, rhythmic and aesthetic aspects of our movement in relation to architectural elements for an answer.

Architectural elements provide a 'stage' for people's movement. One element is more suited to some types of movement than another and thus is specified as a different

element. The question of design strategies in the research is 'which architectural element is for what concept and how?' Generally, to define conventional architectural elements is quite straightforward. But for those that do not have western-oriented concept it is clearer to define them from the way they came to reality in the designers' point of view. It is the matter of realisation in design that defines each architectural element beyond its conventional concept.

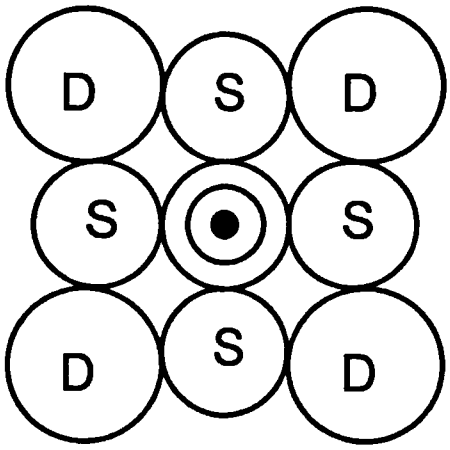


Figure 2.4. Schematic design of Nigri Sembilan polity as a nine-unit system: D = District, S = Serambi (veranda) (Tambiah, 1976: Figure 7.3b:105)
Note: the black dot in the centre is Sri Menanti.

The understanding of various meanings of architectural elements is essential for both analysis and design which is a complex idea and culturally sensitive. Cassirer, Lefebvre and Alexander all acknowledge the fact that culture shapes people's activities and thus their objects. Concepts of traditional Thai architecture seem to have a common set of rules derived from cosmology which is *'... framework of concepts and relations which treat the universe or cosmos as an ordered system, describing it in terms of space, time, matter, and motion, and peopling it with gods, humans, animals, spirits, demons, and the like.'* (Tambiah, 1985:3). Despite its extensive application, this idea still seems to refer back to the human body and proportion (Tambiah, 1976). Tambiah uses some diagrams to illustrate the Indo-Tibetan design principle of city and regional planning and shows that they mostly originated from political necessities (Figure 2.4). The idea of 'District' and 'Serambi' (veranda) is strikingly similar to the typical design of a traditional Thai house that has a 'room' in isolation and is surrounded by a 'veranda' of its own, plus a 'big' veranda in the centre among all the other units. This big veranda was the location of the chief's seat which is the 'meeting' place, as *Chan* in Thai houses.

Thai temples have adopted a centralised system and the Khmer's concept of universe to achieve a symbolically and politically powerful centre of society. However, in Thai houses, this centralised scheme is more subtle but the central element, *Chan*, still greatly influences the house as a whole since it is from this space that an extension of the house can begin to take its form. The concept of universe is in almost every part of Thai temple architecture as described by Kalayanamitr: *'According to 'The Three World' epic, our universe is a unit in a system of unlimited universe. Every universe is the same. In each universe, there is a big mountain, Meru mountain, as its centre and there are seven mountains surround the Meru mountain. Beyond these mountains is the great ocean where there are four continents to the east, west, north and south.'* (Kalayanamitr, 1982:24) (Figure 2.5).

Architectural elements in Thai temples are generated using proportion and number in relation to the formation of the universe and mountains. It seems to be very consistent in every part of the architecture, for example: the location of the cloister, series of terraces or even the number of threads on a *chedi* down to the last detail of the building. Such an idea or any other ideas discussed earlier in this section support the existence of the architectural-element dimension as going beyond the status of mere objects. However, for some, unfamiliar architectural elements from ancient times are the result of fierce temperatures and uncivilised society; *'...the hot climates of Asia, with their violent political and social institutions, were represented by arabesques, by caprices, and by fantastic, unregulated, and licentious architecture.'* (Vidler, 1987:156). But for some architects, a lot more can be learned from the unfamiliar: *'To a functionally-trained western architect these houses look like a sophisticated building system for a dynamic and organic architecture, expressing the growth of the family by the addition of units when required.'* (Thomsen, 1982:86). And because of both positions, a further study is extremely necessary.

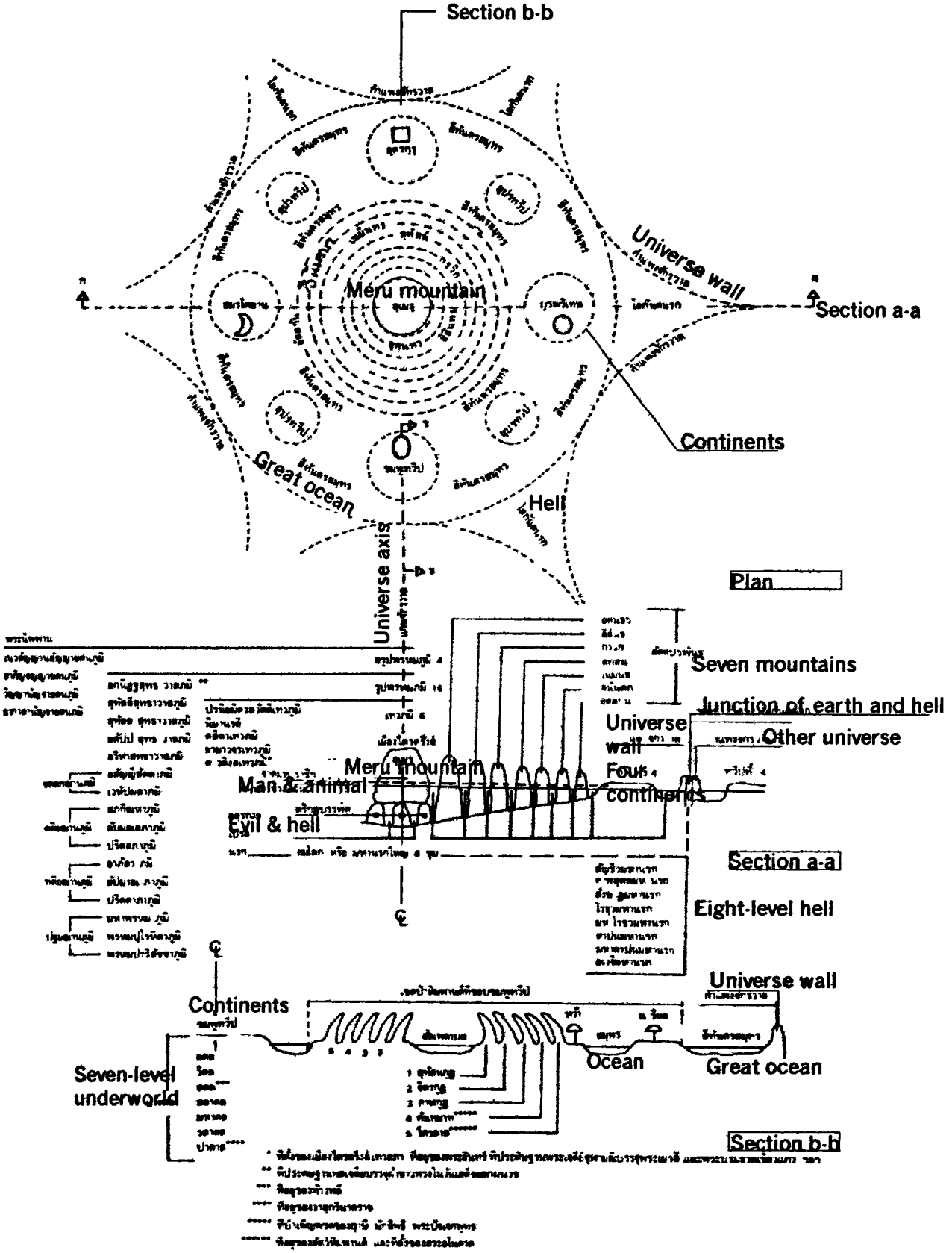


Figure 2.5 Thai concept of universe (Kalayanamitr, 1982)

2.6 Conclusion

Architecture is one of the most complex objects we deal with in everyday life. This is because we do not deal with one aspect of the object when we use a piece of architecture. What is the aspect of an object that really enables us to differentiate it from others? Is it colour, size, shape, material or decoration? The most important aspect of an object is not the one related to what an object looks like. For example, when we look at two makes of car, we realise that the real differences are their 'internal' qualities. They both have four wheels, one engine, doors and seats. What makes the two cars different then, is the concept behind each of them; the concept that says how the car can be used and appreciated by people in its own way; e.g., one car can accommodate more people while the other can go faster, etc. It is the interface of human functionality and objective forms. We understand this concept of thing when we consider objects in a specific way; that is we 'conceive' them not only 'perceive' them. We match our body movement with space and form in reference to other information such as social values, manners or personal knowledge. Then one matches all this information with broader conceptions such as concepts of institution, religious belief, politics, cities or countries and so on.

A piece of architecture is an object as much as a car. However, it is too complex and difficult to grasp its 'objectivity' in a short period of time in the same way as we can with other objects. However, in the first layer of conception most people get it right about architectural space; that is how to move through it. Stairs will always be conceived as stairs by everyone as one does for other elements like doorway, room, hall, corridor, window etc. Generally, people have no problem at this level and mutually reach the same conception. Then comes the deeper conception of how to use the space when not everyone knows and has such a clear idea about as much as how to move in space. Needless to say that the deeper level, such as an idea of institutional status, etc. may not be grasped by all, especially those outside the society or culture. Therefore, the layers of information in architecture seem to start from space (mnipresence) to movement (1st layer: direction and type of interface) to function (2nd layer: interface of body and space) to architectural element (3rd layer: interface of conception in function and body .

If one contemplates a piece of architecture and its relation with human activities, one might want to start from its architectural elements before proceeding to other

considerations such as social or symbolic aspects. This means intense observations on the interaction of different parts of a buildings and people are crucial to begin with, in order to understand what each part of architecture stands for in people's conception. The research takes its information from on-site observations, which are then used to identify different qualities of the selected spaces.

We do not see these properties of space spelt out for the eyes in the same way as in words but instead they must be felt and experienced. However, the properties or syntax of space are so transparent and the higher degree of transparency is the nature of the relations among them. It is like words in that only certain combinations will convey a comprehensive meaning. For example, c-a-t and a-c-t (Eisenman, 1987) convey some meanings while a-t-c or t-a-c or t-c-a or c-t-a don't necessarily mean anything to us. The same is applicable to relations in space where certain functions only associate with certain architectural elements. A bedroom is usually located and used in the architectural element that is called 'room' not in the others like 'hallway' or 'terrace', etc. We can try to design a function of, let's say, 'bedroom' to be more like an open space that is, maybe, allow it some characteristics of 'terrace' but this function will still be conceived as located in an architectural element of 'room'.

In the structure-experience dimension, relations between syntax are less rigid than in the functional and architectural dimension. A function of 'bedroom' and an architectural element of 'room' can be placed at any part of its structural dimension or they can accommodate more than one movement type in the experiential dimension. This 'bedroom' could be placed in either the deepest or shallowest part of the spatial configuration. It can, in actual use, be a junction between other junctions or incorporate a passage into its space which, like its notion of being 'room', usually has a 'place' experience. The factors that would affect these abstractions are those of the deeper value of architecture such as culture, social value, specific customs or rites and ritual. By making an impact on space at these abstract levels, architectural space would really be able to influence the whole conception of its objectivity; that is the evolution of function and architectural elements.

It is also important to note that even though the function and architectural elements may be less influential on the deep concepts of a piece of architecture, they do verify the

existence of those abstractions inside architectural space. It shows that the relations among these multi-dimensions of architectural space are two-way relations; one cannot exist without the other but one can be more influential than the others. It seems that in a designer's concept it is also the two-way relation in which the actual use of architectural space forms function and architectural element. Through time, functions evolve into structure while architectural elements evolve into experience in the users' conception. This is because one seems to have a better knowledge referring to where which function is, than referring to which connection leads to which space. One also seems to relate one's experience in movement to what one sees not to how one moves.

All of these evolutions in architectural space are mediated through movement. The structural dimension is the way spaces are connected through movement. The experiential dimension is how spaces are moved through in movement. The functional dimension is how spaces are assigned with meanings of use in movement. And the architectural-element dimension is how spaces are finally given envelopes to accommodate movement. All together they evolve into a conceptual whole in which they cannot be separately understood.

The idea of a conceptual whole and its elements may again be illustrated using a continuation of Eisenman's analogy. *'If we add a third term, the verb, 'is' we have the form, 'cat is' and 'act is'. Now, if we superpose them and produce a third form 'cactis', it is a sign which does not mean anything in itself. While it is similar to 'cactus', it does not in itself represent or suggest the plant or the desert.'* (1987:19). Eisenman's approach is probably not enough because he deals with conception through perception only. The exercises using c-a-t, a-c-t, cactis, etc. emphasise the elements of the configuration but not its whole abstraction. This makes these elements become only fragments of the isolated dimension within a syntactic structure. In architecture, its abstraction, to use the analogy of the cited exercise, is in the essence of the c-, the –a and the -t independently as much as in their combination. Eisenman sees this relation in architectonic strategies only. Inventing different kinds of architectonic syntax such as using a broken column or bent lintel or tilt window does not always reach the total abstract value of the structural and experiential dimension. This strategy seems to affect only the parts not the whole configuration.

At this point it is crucial to understand that the research asks the question at a theoretical level concerning architecture as an artificial system designed to serve social activities. From here the theory of spatial configuration proposed by Hillier and Hanson (1984) has provided the tool by which any artificial system can be numerically compared to others (Hillier et.al, 1987). The information and data compiled through the analysis of configurational relations portrays the physical relations of space or, in other words, of spatial envelopes. At this point, the theoretical life of architectural space reaches its concrete expression that is its envelope or its product. From here, in analysing the existing building, another quality of people's experience of architectural space begins. From the most abstract, how they move in space, to the most physical, how they conceive architectural space as fitting into the common architectural language, the analysis proposes to superimpose these two sides of architectural experience onto the configurational relation of architectural space. Having seen and compared them in the same context, it is proposed that we may be able to understand better and make clear the relations among all the necessary dimensions of architectural space and how it evolves into a socio-cultural object in use.

For example, the 'space of a door left ajar' (Lawrence, 1994) is treated as a junction in the experiential dimension because it signifies the change of movement and thus indicates a sense of junction in general. Also this same space is seen as a circulation space in its functional dimension and as a doorway space in the architectural-element dimension. The meanings of different codes that, for example, a doorway space might suggest, needs further study about the socio-cultural aspects of use from different cultures or even in houses of different families (Wood and Beck, 1994). However, the current research emphasises the common understandings and uses of architectural space in everyday life. This multi-dimensionality of space thus assumes universal meanings i.e. topological meanings: a-b-c-d type spaces, experiential meanings: passage, junction, place, functional meanings: bedroom, kitchen, circulation, entrance etc. and architectural-element meanings: doorway, stairs, room, window, courtyard, hall, etc. These terms, used to give simple explanations, are comprehensible by common knowledge. They are oriented towards the instrumentality of knowledge rather than the interpretation of the psychological meanings of activities.

'What, then, must be our representation of space...? It must in its origin be intuition; for from a mere concept no propositions can be obtained which go beyond the concept-as happens in geometry... Further, this intuition must be a priori, that is, it must be found in us prior to any presentation of an object, and must therefore be pure, not empirical, intuition. For geometrical propositions...are bound up with the consciousness of their necessity...Such propositions cannot be empirical or, in other words, judgements of experience...' (Kant, 1929:70). This is one of the reasons why the research does not put perception in front of conception as received by people in architectural space. Geometrical descriptions of the shapes of space, for example in Nerlich's sense (Nerlich, 1976), are seen as pure abstraction. In architecture, as an intentional act of building, intuition cannot totally be a pure priori in Kant's sense which is why in considering intuition in architectural space, either the architects' or the users', it will be laden with some kinds of concept. In this way, space used architecturally will never be seen as a pure abstraction. Therefore, the structural dimension of space will make no sense of architectural space without other dimensions and vice versa.

The information from the structural analysis is seen as the link between abstraction and reality; so that we are able to discuss and compare different examples. We cannot take information from a structural analysis to explain reality right away. The information needs to be simultaneously seen through a sequence of different spatial dimensions. The different dimensions that make up a relational syntax are to be analysed in their own terms and qualities. What relates them together is space inside architecture. There is no intention to determine a piece of architecture in reality with these relations. It is only the question of how each dimension has come about in its present state by looking at possible relations among these dimensions. Architecture in this sense is not like language at all because an outcome is produced from, and only from, its original constituents which offer unique understandings once the final substances emerge. We see 'cat' as well as 'c-a-t' or 'classroom' and 'class-room' in one comprehension. This unique understanding depends on internal relations which do not change the meanings of space itself only the concepts of space that may vary according to different relations among the concept of different dimensions. Architecture is somewhat chemical when seen from its internal relations. H2O and H3O make different substances because of their internal relations but this does not affect the fact that they both have the same ingredients.

For example, a hospital and a hotel are the same things until they are separated by the internal relations that are prioritised by spatial configurations. Location, connection, function and organisation are different in every topographical section of these two. Had a hotel been equipped with an operating theatre and an emergency unit, it could easily work as a hospital. This situation is realistic in practice; equally if we add another molecule of oxygen to CO2, we can get CO3. However, architecture is not mere substance, but when it works,it works only through its substantiality which is sensitive to socio-cultural factors. In this way, a building may be built to work as a hotel but it can be made to become a hospital providing that people find that acceptable. It is here that different dimensions of architectural space formulate their relations. The same spatial structure might not have the same spatial experience when people are inside it. This depends solely on people's conception of such a space in which both structure and experience of space play a very influential role.

Function and architectural element are the means for space to act, a tool for us to use and experience space, and the framework for the structure and experience to exist. Like structure and experience, function and architectural elements relate to each other using internal relations which are practically predictable but conceptually unpredictable. These four dimensions have the same character of relations, bi-directional, among one another. One is the realisation of the others. After all, architectural space is nothing without structure, experience, function and architectural elements and vice versa. Their importance lies in their relations to one another and of even more importance is how we can indicate them. This is the aim pursued in the methodological part of the research. The concept of spatial configuration, topological relations topographically defined, thus serve as the fundamental concept of the research methodology.

3. The Research Methodology

It is important to understand that the methodology presented and employed in this research is the application of ideas developed in chapter two. Therefore, as a whole, the methodology is designed to address the phenomena of the abstraction-to-architectural reality process. Consequently, the methodology comprises a series of analytical frameworks used to reveal different qualities of the architectural spaces and more importantly the relations among them. The chapter aims to discuss in detail the objectives, techniques and interpretation of data in each procedure and of the whole methodology in reference to its theoretical proposal. In order to clearly present the logic of the methodology, a set of spaces from an actual building will be presented as an example along with the proposed procedures. By the end of the chapter, a general understanding of the methodology will be achieved along with some preliminary information about the nature of architectural spaces in general and in specific types of spatial configuration. Thus the chapter serves as the link between the research's theoretical argument and its findings in the analytical chapter.

The analytical methodology sets out to identify the relations among the structural, experiential, functional and architectural-element dimensions of space in architecture. The structural dimension refers to the ways one space connects to another while the experiential dimension refers to the ways in which spaces are experienced. The functional dimension refers to the ways people use space, while the architectural-element dimension refers to the ways architects assign physical entities to space. All dimensions are comprehended through movement. From the most abstract to the most concrete properties in architecture, the idea starts from an understanding of architecture as a whole and then moves toward the more specific assignment of its spaces where they are translated into functions and architectural elements. Each stage represents a self-contained set of data, which therefore suggest that the independent investigations of each dimension can be undertaken in parallel.

The basis for the comparisons, analyses and conclusion are the spaces that are both physical and operational. The spaces are physical because they construct an object through their structural system. They are operational because they represent how parts are related. Therefore, the spaces in each example are divided into convex spaces (Hillier

and Hanson, 1984) in order to study them both as a whole and individually. The topological properties, physical envelopes, as well as social significance define each space since not every space is rigidly bounded by architectural elements. There are some situations where social activities strongly influence people's conception of space. For example, a space in front of the altar, where people assemble to pay respect to a revered image, has a strong definition and tends to stand out from other spaces around it. This kind of space is often enhanced by architectural gestures that are usually designed to signal such an important place. Other spaces with less symbolic value can also be defined in this way, for example, a big open space in front of the main entrance, a 'residual' or pocket space attached to a multipurpose terrace or a space used for seating, etc. All these considerations are made possible by on-site observations.

The concept behind the analytical methodologies is to proceed from a global picture of a spatial configuration to the internal logic of space and, in parallel, from abstraction to architectural reality. The structural dimension of space is translated from a plan into graphs where the structural dimension of a building can be seen as a whole. As the consequences of being in or using the structural dimension, the experiential dimension is individually realised in each space through actual participation inside the space. In this respect, it represents the internal logic of space that might at first be elusive but can be recognised, established and evolved into functions and architectural elements over a period of time. This is especially strong in a mature society that has used its traditional architecture for specific purposes and in specific ways. With these considerations, the analytical methodologies progress from the exterior to interior and from general to detailed analyses. The analysis is aimed at discovering whether there are any genotypes in the relations between different spatial dimensions by analysing structure, experience, function and architectural elements in one another's presence. And if so, how they are used in a particular way in the designs. In other words, it is an investigation that starts from intelligibility to movement and from space to architectural reality as is, and as it is conceived by people.

Inputs from architectural documents and actual observations are needed in the structural and experiential analysis. Firstly, convex spaces are mapped over the plan of the example. Secondly, each convex map is justified into a linear graph which becomes the gl bal system where local scale analyses will take place on each space. Thirdly, theoretical

analysis is made on structure-experience relations. Fourthly, basic syntactic data is calculated for every space in the justified graph of the building and thus the information in a global scale is outlined. Next, design analysis looks at the functions and architectural elements based on the information from on-site observations. Route analysis is then made on important routes in the building in order to pinpoint any special effects of space that characterise the way each building is actually used and conceived in main activities. Finally, relations among different dimensions of space are discussed and analysed as design strategies that create architectural reality.

A study of the Buddhapadipa temple in London is used as an example, the only Buddhist temple in Europe designed and built in the traditional Thai style. The temple was design by Praves Limparangsi with the *ubosot*, ordination hall, of approximately seven by fourteen metres in a cross shape surrounded by a large terrace. It was completed in 1982 and is located at 14 Calonne Road in Wimbledon. The temple has two main parts: the *ubosot* where religious activities are performed and the multi-purpose terraces. The temple is located in the centre of the site where it can be easily accessed from most areas of the monastery (Figure 3.1). On-site observations were made on many occasions at different times and included personal discussions with the monks and the users of the temple; the same procedure is used with the selected examples in chapters 5 and 6.

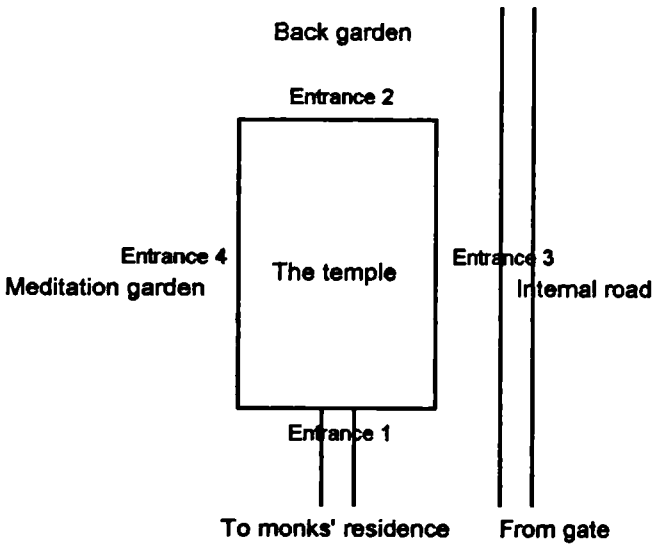


Figure 3.1. Layout of the Buddhapadipa temple

The *ubosot* is raised about 2.2 metres from the terraces which provides a clear boundary between the purified religious and everyday non-religious area. The elevated terraces are

usually employed as the three-dimensional transitions that separate the temple's space and exterior spaces. However, the terraces here are used in a more casual way serving as the passage to and from almost all the areas of the temple as well as to the *ubosot* which is well integrated with the terraces. The *ubosot* is considered shallow from the terraces because it lies on at least two rings of circulation. The analysis was made considering the *ubosot* and the terraces as one global system.

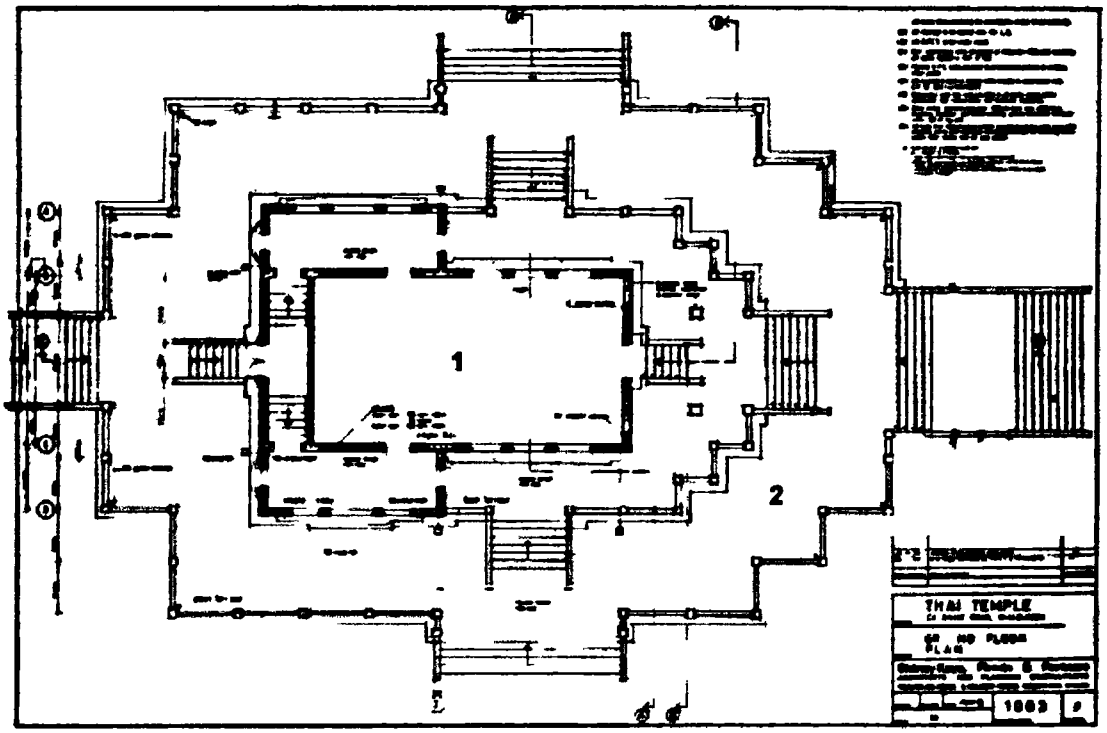
3.1 The analysis

Numerical data: Tables 3.1 (p.85), 3.2 (p.87), 3.3 (p.88), 3.4 (p.91), 3.5 (p.92), 3.6-3.8 (appendix)
Graphical data: Figures 3.2-3.8

Convex space analysis

The term 'convex space' was coined by Hillier and Hanson to identify spaces of a system where *'Two dimensional organisation could be identified by taking the convex spaces that have the best area-perimeter ratio, that is the 'fattest', then the next fattest, then the next, until the surface is completely covered.'* (Hillier and Hanson, 1984:16-17). A convex space is segmented according to its topographical properties defined by physical settings, e.g. walls, doorways, windows, columns, steps etc. as well as social settings that do not always have physical boundaries, e.g. gathering area, rest area, pavilions, halls etc. In situations where people relate their social activities to the particular area of space, convex space is established without physical settings but with people's movement in activities. Therefore, a convex space in this research expands its notion into three-dimensional substance where a sense of rooms within a room prevails.

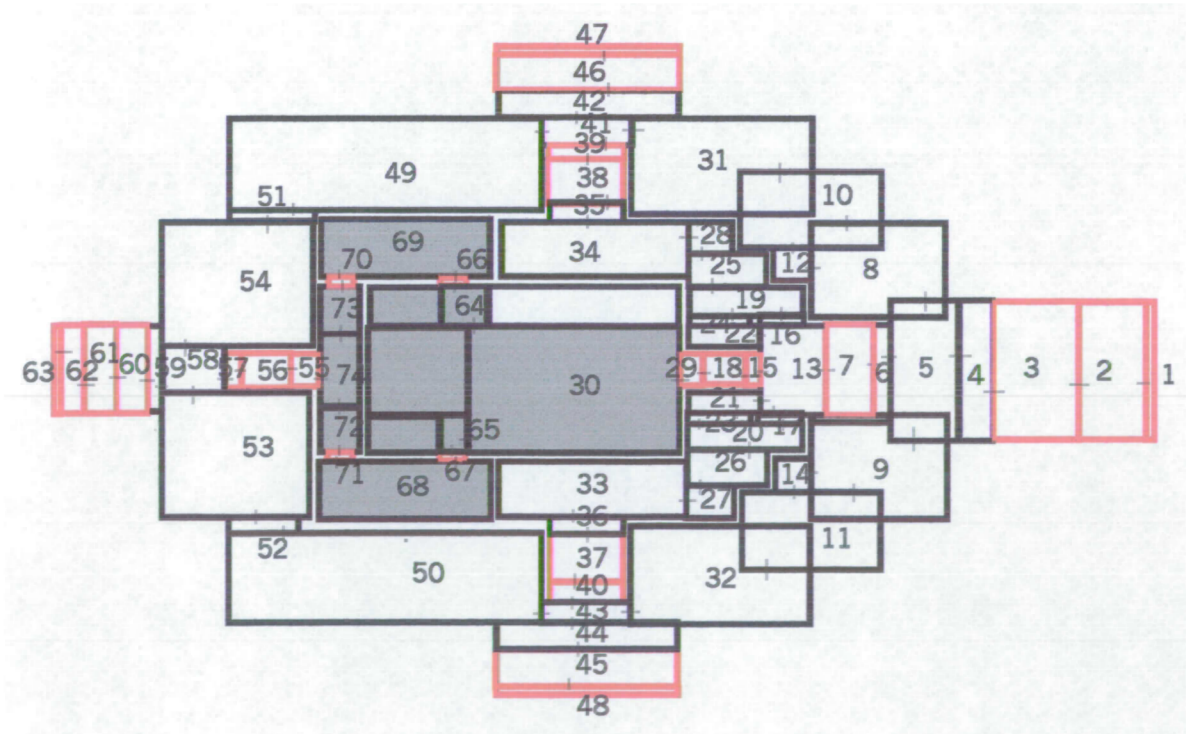
The design of this temple is in total symmetry on the east-west axis. From the plan (Figure 3.2), the *ubosot* and the terrace space can be topologically broken up into 74 convex spaces with 40 open spaces mainly of terrace spaces, 26 connecting spaces of stairs and doorways and 8 enclosed spaces inside the *ubosot* (Figure 3.3). The *ubosot* space is connected to the upper terrace at the front and the lower terrace at the back. Traditionally, people's concept of a temple is in both the *ubosot* and the terraces because they are both involved in the activity of 'going to the temple'. Therefore, the exterior space for the analysis is the space beyond the terraces.



แผนผังอุโบสถ Archtectural plan of the Chapel

1 Ubosot 2 Terrace

Figure 3.2 Plan of the Buddhapadipa temple



☐ Open space Connecting space Enclosed space

Figure 3.3 Convex map of the Buddhapadipa temple

Justified graph analysis

The justified graph is used as the basis for further structural and syntactic analysis. It is the permeability structure where every convex space in the system is identified according to its relation to every other space or the relational logic of parts to the whole. Hillier describes the characteristic of a justified graph as *'In this we imagine that we are in a space which we call the root or base of the graph, and represent this as a circle with a cross inscribed. Then, representing spaces as circles, and relations of access as lines connecting them, we align immediately above the root all spaces which are directly connected to the root, and draw in the connections. These are the spaces at 'depth one' from the root. Then an equal distance above the 'depth one' row we align the spaces that connect directly to first row spaces, forming the line of 'depth two' spaces, and connect these to the depth one spaces, and so on.'* (Hillier, 1996:32).

The research deals with buildings as a whole identity that represent the design world in contrast to the general environment. The analysis starts from outside moving into the building. In a justified graph, a space is represented as a circle and lines stemming from it represent its connections to other spaces. The letters: a, b, c or d represent the structural dimension while colours: blue (passage), red (junction) and yellow (place) represent the experiential dimension. a-type is the dead end space, b-type is the only space connects an a-type space or isolated sub complexes. c-type space is a member of a ring with two or more connections while d-type space joins two or more rings together with three or more connections. Passage-type is the experience of 'to-from' movement while junction-type is 'in-between' and place-type is 'inside' experience of movement. Other information such as important routes can also be presented in the graph as coloured lines. The spatial configuration of this temple is structured as illustrated in Figure 3.4.

The distribution of different space types can be seen clearly in the justified graph. This fact can be more important to the system than the integration value of each space type because it is likely that the space type that covers the largest area would be the one that characterises the structure. For example, in this temple d-type is a very powerful integrator as it is dominant in important levels of the graph including the most extensive level 6. However, c-type is dominant in many levels such as levels 1, 2, 5, 7, 9 and 11-14. In this way, the most well distributed and expansive structure is the c-type which also links with other dimensions that make the whole temple. The structural rivalry between c-and d-type spaces will be closely examined in later analyses where space is seen in theory and design.

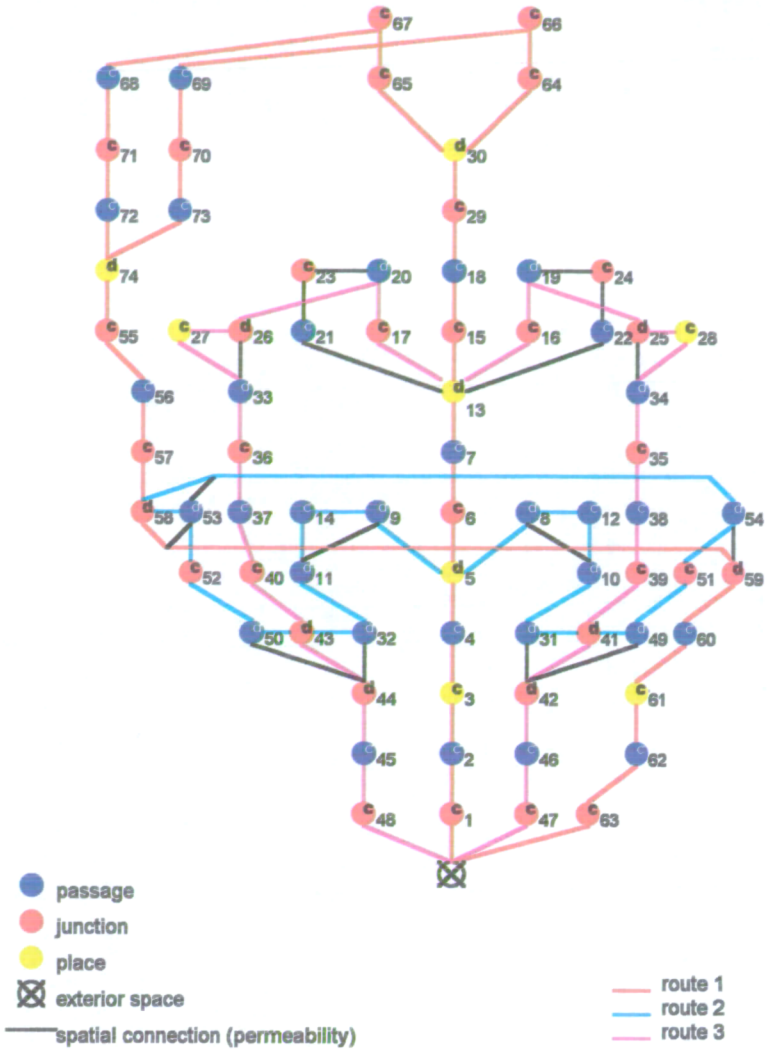


Figure 3.4. The justified graph of the Buddhapadipa temple with the theoretical analysis of space types

Buddhapadipa temple: Space types					
Structure	Number of space	%	Experience	Number of space	%
a	-	-	passage	35	47.30
b	-	-	junction	33	44.60
c	48	64.86	place	6 + 1 (ext)	8.11
d	26 + 1 (ext)	35.14			
Total space = 74 + 1 exterior space					

Table 3.1: Proportion of Structures and Experiences of the Buddhapadipa temple's space

Theoretical analysis

The analysis involves two dimensions: a-b-c-d-type spaces and passage, junction and place type spaces which are both comprehended through movement. a-b-c-d-type spaces are differentiated by their numbers of connection to and from others while passage,

junction and place type spaces are differentiated by their physicality in architecture. Therefore, the definition of these space types is made of two realities that are actual body movement in time and a conventional notion of architectural space as people know it through common activities in buildings. In this way, people movement and functional reality are brought into the same medium of space in common architectural recognition.

In observations, space of this temple seems to be a well-integrated experience. One could move freely through its space after one or two visits. The *ubosot* and the terrace space are well connected to each other by the front and back entrances. Preliminary and broad propositions on the relations among the structural (a-b-c-d) and the experiential (passage-junction-place) types are that an a-type space seems to have a strong sense of place or 'room' whereas b-type suggests a stronger sense of passage than junction. c-type, from this building, seems to suggest a stronger sense of junction than passage while d-type also seems to suggest a strong sense of junction, however it is less than that in c-type. This is maybe because a d-type has strong potential to be a passage and 'meeting' place. These proposed relations are mainly based on the nature of movement associated with or generated by both dimensions. The relationship suggested here will be observed further in the design and strategy analyses.

As seen from table 3.1, the main space types of the temple are c-type, passage and junction spaces which are about 92% of the whole space. Similar to b-type, c-type space creates segregation suggesting that these two types may be easily transformed from one to the other and could provide the same structural effect. For example, spaces 2, 3,4, 45, 46, 60, 61 and 62 are c-type if the exterior is counted because they are parts of rings whereas if the exterior space is discounted they become b-type spaces. It could therefore be the case in this temple and perhaps in others that a b-type creates more segregation effects than a c-type space. The obvious reason for this is that the graph is less ringy when the exterior is discounted. However, globally this view is not realistic because there must always be exterior space for building space to exist.

d-type space represents about 35% of the whole space with or without the exterior; it has a strong proportion against the exterior-sensitive c-type. This could mean that the quality of the whole space of this temple is mostly maintained by d-type spaces. Only four a-type spaces could possibly happen when we consider the temple without exterior space which

means that its status is not stable. Spaces 1, 47, 48 and 63 become a-space when they are not connected to the exterior space although this situation is not a 'realistic' view of any piece of architecture. Considering their proportions, passage and junction are comparably strong at 47 and 45% respectively. Place-type space contributes to the whole space at only 8%. Globally, these experiential space types are stable and are 'the common experience' in most architecture. According to proportion and actual experiences, the temple's space seems to be mainly controlled and maintained equally by passage and junction type spaces. Place-type space also plays an important role but in a subtle way that is not revealed in a purely numerical analysis. The analysis will be accompanied by actual observation which will further clarify the effect of these spaces.

To summarise at this stage, the temple's space is globally dependent on d-type, passage and junction-type spaces. In order to discuss further, we might want to look at the configurational values of each space. Space Syntax provides techniques to calculate these values for every space in the system. Its logic is based on relational properties of each space within a spatial configuration. Further syntactic analysis based on the set of syntactic values will make a more complete theoretical summary.

Buddhapadipa temple: Structure-Experience									
Type		**Passage** no. (%)	Int. value (mean)	**Junction**		**Place**		Total space	Int. value
a		-	-	-	-	-	-	-	-
b		-	-	-	-	-	-	-	-
c		21 (28.4)	12.248 (0.583)	25 (33.8)	14.555 (0.582)	2 (2.7)	1.147 (0.574)	48 (64.9)	27.950 (0.582)
d		14 (18.9)	9.258 (0.661)	8 10.8)	5.231 (0.654)	4 5.4)	2.540 (0.635)	26 (35.1)	17.029 (0.655)
Total space	Int. value	35 (47.3)	21.506 0.615)	33 (44.6)	19.786 (0.599)	6 8.1)	3.687 (0.615)	74	
Total space = 74 + 1 exterior space (0.628)									

Table 3.2: Structures-Experience relations of the Buddhapadipa temple's space.

Syntactic analysis

From the justified graph, basic syntactic data can be calculated for each space in the graph. The useful syntactic values for the analysis are the integration and control values, connectivity, space-link ratios (SLR) and base difference factors (BDF) (Hillier, Hanson and Graham, 1987). These values enable the precise comparison of spaces in a spatial configuration or across many examples. For example, a space with a high integration value is a relatively powerful element that, when referred back to its place in architecture, may be said to have more effect upon the existence and the use of such a spatial configuration than the one that has less integration value. As a result, cultural patterns can be traced *'If these numerical differences in functions are in a consistent order across a sample,...'* (1987:364). Evidence of this argument will be demonstrated with further analyses of the functions and architectural elements.

Integration value, base difference factor and space-link ratio characterise a spatial configuration as a whole. Using this data, it is possible to compare different buildings in terms of their depth, 'inequalities' (H, H&G, 1987) and complexity describing the deep structure of spatial configurations. Base difference factor indicates homogeneity of a system when a value is close to 1 (integration values in the system are very similar) and decreasing when approaching 0 (integration values in the system are very different). The degree of 'ringiness' of justified graphs can be compared using space-link ratio from the value of 1 (a straight-line graph) which increases according to the degree of complexity in the structure of the graph (1987). The research adopts these measurements when comparing across all the examples in the analysis chapter. For the Buddhapadipa temple, these basic syntactic values are shown in table 3.3.

Buddhapadipa temple: Basic syntactic data						
Temple number	Number of cells	Space-link ratio (no. of links + 1/no. of convex	Integration with exterior mean	min.	max.	Base difference factor
example	74	1.28 96/75)	0.608	0.467	0.772	0.655
Total space = 74 + 1 exterior space						

Table 3.3. Basic syntactic data of the Buddhapadipa temple's space.

The Buddhapadipa temple has a low integration value (0.6). The shallowness of the configuration is also shown in its low SLR value. The distribution of integration values, BDF value, within the complex is also low in homogeneity. The temple is a contemporary Thai design that is simple and minimal. In total, it has 74 spaces which is small for a Thai temple resulting from both the new interpretation of Buddhism and requirements of the community where the temp e is located. In this rare case, the temple is in London and thus serves an international public. However, its design basis is fundamentally a traditional one.

The integration values of all spaces in the Buddhapadipa temple (table 3.10 in disk) are the reciprocal values; that is, the higher the number the more integration value a space has (H, H&G, 1987). At this stage, some structure-experience types and relations are more visible than others. In general, the temple space seems to be structured around d-type space and its experiences are mainly influenced by passage and junction types. There are 26 d-type spaces in the temple many fewer than c-type spaces (48) but they play a more important role in the structure. Place type has about the same number of spaces in its relations with both c and d types. In this temple, d-place is in spaces 5, 13, 30, 74 and 75. The space with the highest integration value is space 5 (0.772) where the worshippers pray on the terrace while space 13 is the place before the stairs that leads into the *ubosot.* Space 75 is the exterior space, space 30 is the main prayer hall inside the *ubosot* and the least integrated d-place is space 74, the hall at entrance 2 at the back of the *ubosot.*

c-passage and d-passage spaces are possibly the main experiences considering their numbers while in terms of integration value, d-passage has its mean integration = 0.661 whereas c-passage has its mean integration = 0.583. Numerically, it is almost predictable that d-passage will be more integrated than c-passage space but in spatial experience, due to their wide-spread range and positions in the justified graph, c-passage spaces are in better control. The dominant c-passage spaces suggest more c-junctions where people turn. c-junction has total integration value = 14.555 while d-junction's total = 5.231 (Table 3.3) indicating that c-passage space may have more global effect than d-passage. It also ranges from spaces 2 to 73 which means that in people's experience it is quite consistent. This quality is shown in both the plans and justified graphs.

In a very complex building as in some of the selected examples, the depth, control value and connectivity of a space can be used to differentiate spaces that otherwise seem to

have the same integration value. For example, spaces 6 and 13 have quite close integration values (0.751 and 0.735, respectively) but space 13 has a much higher control value and connectivity (3.000 and 6 in comparison to 0.750 and 2). At this stage, d-place space is a strategic space in this temple's design; that is, it is strong not only in terms of structure but rich in experience as reflected in its high control value and connectivity. In this way, a space or a series of spaces with distinct syntactic values may as well have architectural significance that characterises such architecture.

This proposition raises an important point for architectural design; that is, its existence as a cultural object in relation to such important spaces or specific routes in a building as will be seen in route analysis. But before that, we will look at the other two dimensions of architectural space, architectural element and function, as they are both the reason for and the result of our movements in space. Together with space-type analysis, which takes into account how people move and what kind of experiences they have in different spaces, design analysis will move from the analytical view of theory to the socio-cultural aspects of use and form which turn space into architectural reality.

Design analysis

Architecture is initially conceived by architects and later its design is conceived again by users at a much slower pace as they turn architectural elements into functional objects. Architectural elements put together by architects leave 'room' for users' conception and create meanings when they interact with others in the system through their operational properties in movement. Using a global scale analysis of the justified graph and basic syntactic data, space in selected examples is broken down according to topographic and socio-cultural criteria into convex spaces that are represented as cells in a justified graph. Space is further analysed as having seven types according to movement. Having investigated space internally, the design analysis takes an external view of space when space is translated into architectural elements and functions by architects and spontaneously conceived by users. The analysis completes the circle of abstract space to architectural reality and from movement to functional assignments resulting in each space type and its syntactic values can be seen with its architectural elements and function and vice versa.

As an operational entity, a large portion of space would function as 'circulation' in any one building. But the more interesting point is that it is also likely that different kinds of building will have different amounts of circulation spaces as well as those of other types of space. Consequently, it is possible to say the same for architectural elements. For example, about 88% of spaces at the Buddhapadipa temple are used for general circulation purposes. Likewise, the architectural elements of terrace and stairs are the dominant types, comprising about 85% of the temple's architectural elements (Table 3.4). Other functions are mostly exclusive to the temple type such as prayer space and prayer hall functions which are much more important than circulation considering people's and architects' concepts about a temple. And yet they represent only about 5% of the whole space and are comparatively much smaller in area than the circulation space.

Buddhapadipa temple: Function and Architectural element types					
Function	Number of space	%	Architectural element	Number of space	%
circulation	65	87.84	Terrace	43	58.11
entrance	4	5.41	Stairs	20	27.03
prayer space	3	4.05	Doorway	5	6.76
prayer hall	1	1.35	Hallway	4	5.41
foyer	1	1.35	Hall	2	2.70
Total space = 74 + 1 exterior space					

Table 3.4: Proportion of Functions and Architectural elements of the Buddhapadipa temple.

'hall' element, which has traditionally been an important element in temple design, contributes to the whole space at only 3%. What significance does this paradox have for the nature of architectural space? Before we can answer this question, we might want to look further at the relations between the functional and architectural-element dimensions. Concerning the number and area of each space, the research will focus on the ideology behind each space rather than the requirements which are worked out specifically in each building in square metres etc. However, the research will refer to its impact along the way and will come back to this issue when discussing design strategies in the conclusion.

The term 'architectural elements' refers to different parts of architecture such as room, stairs, terrace, window, doorway, hall, hallway, courtyard, cloister, gateway etc. One

architectural element might contain more than one convex space and those convex spaces could represent different functions. The function of a convex space is identified according to the on-site observation of how each space is used in usual situations. For example, a bedroom is listed as 'room' when it is considered as an architectural element but as 'bedroom' when it is considered as a function. In another example, a terrace could have more than one function for its convex spaces: e.g. rest area, circulation or entrance, whilst every space on a terrace is listed as 'terrace' when it is considered as an architectural element. This is because people may use different parts of an architectural element in different ways suggesting that there are at least two dimensions of space that are simultaneously recognised by users. An architectural element is one dimension that forms a concrete structure which can be literally related to the justified graph, while function is seen as the consequence of having used a structure of architectural elements.

Buddhapadipa temple: Function-Architectural element

Type	circulation	Int. value (Total)	entrance	Int. value	Prayer space	Int. value	Prayer hall	Int. value	foyer	Int. value	Total	Int. value
terrace	41	0.642 (26.31)	-	-	2	0.754 (1.507)	-	-	-	-	43	27.824
Stairs	14	0.588 (8.232)	4	0.594 (2.374)	2	0.574 (1.147)	-	-	-	-	20	11.753
Doorway	5	0.489 (2.445)	-	-	-	-	-	-	-	-	5	2.445
Hallway	4	0.481 (1.924)	-	-	-	-	-	-	-	-	4	1.924
Hall	-	-	-	-	-	-	1	0.530	1	0.503	2	1.033
Total	64	38.918	4	2.374	4	2.652	1	0.530	1	0.503	74	44.979
Total space = 74 + 1 exterior space (0.628)												

Table 3.5: Functions-Architectural elements of the Buddhapadipa temple's space.

In table 3.5, the idea of terrace is strongly linked with the idea of circulation in this temple and perhaps in other traditional Thai temples, and questionably in so-called 'dynamic' Thai houses. The idea of stairs may have a special notion here at the temple and it seems to be an important one when looking at the functional and experiential dimensions. Spaces 3 and 61 on the stairs are the places for worshippers to gather and pray without going into the *ubosot*. However, they have low average integration (0.574) and control values (1.000) and connectivity (2). Another interesting phenomenonis the terrace-prayer space, it has the same number of space as prayer space-stairs relation but

the former is in space 5, the highest integrated space (0.772), and space 13 with the highest control value (3.000) and connectivity (6). However, a high syntactic value does not always indicate the degree of importance of a space; e.g. the most important place in a temple is the prayer hall, space 30 in this temple which has middle to low syntactic values. But the values do suggest the overall effect of important relations such as d-place and c-passage spaces in this temple with good distributions in the graph and high integration values (0.635 and 0.583, respectively). In this way, the analyses give a global picture of the temple's space assuming that people experience the whole building.

At this stage, the methodology has raised questions about the design effects of some spaces on the whole piece of architecture. As a user, one does not or rarely becomes involved with the whole spatial configuration. As a member in a society or a community, one does not conceive a piece of architecture as a pure object. And as an architect, one has to be both a user and a member of a society in order to make practical sense when designing space. It is, therefore, proposed here that relations among different dimensions of architectural space should also be seen not only in its global context but also in more specific contexts. By doing this, we will have a better idea about the whole because we know more about how its most significant parts are meant and designed to serve. What will the temple's space be like for people who come just to pray inside the *ubosot*, religious-related activities, or just to walk around on the terrace, non-religious-related activities? Route analysis answers these questions by studying major routes of the temple's space and looking at them in their structural, experiential, functional and architectural-element qualities. Seeing all dimensions together will give an idea of how people see them and how they form a well-connected whole.

Route analysis

In each selected example, there are some key routes that are more important than others. It is often the case that these important routes are also the important parts of a building and design, especially those that have firmly established principles such as traditional houses and temples, because they are also likely to establish certain configurations. This analysis focuses on the sets of spaces that are grasped by the majority of people using a building for major activities. In other words, it is the analysis of how a building is known by its most important functions through the most common movement in its most significant features. The data from this analysis complement the global scale analyses in

discovering the special characteristics of a building as it is conceived by the people who come to participate in specific activities or those who just want to walk around.

This is how pieces of architecture become different either as individuals or as one of a particular kind. Each piece of architecture has a 'formula' that was planned by the designer and evolved during the course of its use. It is argued here that, like a text, architecture assumes its own discourse once transformed into an object. However, its objectivity can be analysed and, it is hoped in some degree, used to reproduce similar effects or introduce innovative ones. Thus, route analysis is seen as the first step of viewing analytical data as a practical design tool. This is because architecture, in its special character, is known and then appreciated or serves the majority of its users by its parts not by its wholeness. This fact is obvious in the case of complex buildings or even in a domestic space where each member of the family knows the architecture of the house in a different way (Wood and Beck, 1994). There are few parts of architecture where the users share their social activities among one another in a less mechanistic way. They are the spaces that make the difference as opposed to those places where space is the same in any building e.g. engine room, storage or service section where other criteria such as efficiency take control over socio-cultural ones.

The analysis is therefore an attempt to use and incorporate the data from earlier analyses that deal with space in general, into a more focused analysis of the most important areas of architecture, where the best, or the most intimate, interface between architecture and people takes place. The analysis is based on the conception of space in use not on perception in a technical sense, which is seen as a more subjective approach in the realm of geometry and not necessarily directly related to the socio-cultural aspects of space. The routes used for the analysis are the major routes representing social activities involved with the building. For the Buddhapidapa temple, there are three basic routes that the majority of people commonly use: route 1 which goes through the *ubosot*, route 2 which goes round the lower terrace and route 3 which goes round the upper terrace. All the routes are summarised in a sequence from where each starts to where it ends. All properties in the structural, experiential, functional and architectural element dimensions are listed side by side for comparative purposes. Syntactic values are listed for each space as the global reference. All of them are assumed to be invariant properties of each space

in both directions of a route. Because of this, people know the routes by their intrinsic qualities not by their spatial impressions that could be different in different directions.

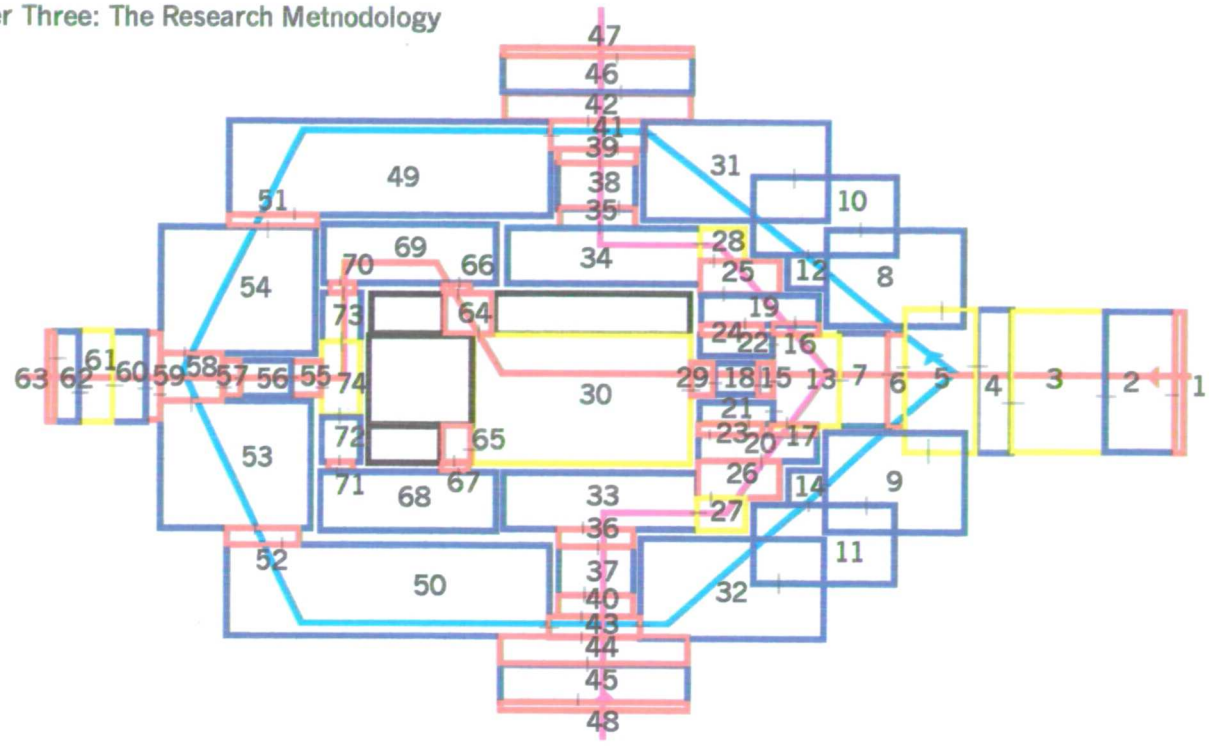
At this temple, movements involve both religious-related activities and non-religious or everyday activities. Generally, the *ubosot* is used for religious-related activities and the terrace is mainly used for non-religious activities. Along with aspects of activity, the following analyses will look at theoretical and syntactic aspects when discussing space types and their meanings. These aspects will be dealt with first in each route in order to pinpoint some critical effects to follow. The design aspects will be discussed next by looking at those effects in terms of the function and architectural elements that are involved in each route. Having related two analyses on the same important points, thus, the methodology approaches the relational knowledge in a relational way.

Route 1.

This route is mainly used in religious-related activities, for example, prayer and meditation. However, people also use this route to get inside the *ubosot* for both religious and visiting purposes. Since both movements lead into the *ubosot* where the pattern of movement is mainly for religious-related activities, we can assume and look at those activities as religious-related movement. Table 3.6 shows all the spaces in this route starting from entrance 1 through the *ubosot* to end at entrance 2 (Figures 3.5 and 3.6).

Theoretical and syntactic analysis

Route 1 contains the most integrated line of movement with the axial line that starts from entrance 1 and goes into the *ubosot*. Considering every space that lies on the route as part of the activity, the mean integration value of these activities is the lowest among all three routes (0.591/0.686/0.617). The integration value of route 1 is also the only one that is below the average integration value of the whole place (0.608). Although the route contains many key spaces such as spaces 5 (0.772) and 13 (0.735), its structural relation to the whole space is still lower than others. There are 4 d-place spaces, out of the total 27 spaces, in route 1. This route contains 21 c-type spaces which are the combination of 9 c-passage, 10 c-junction and 2 c-place spaces. From the space-type analysis, a high number of c-passage space suggests good integration and high circulation and many turnings which then generate a high number of c-junction spaces.



Passage Junction Place

Route 1 Route 2 Route 3

Figure 3.5 Buddhapadipa temple, Route analysis

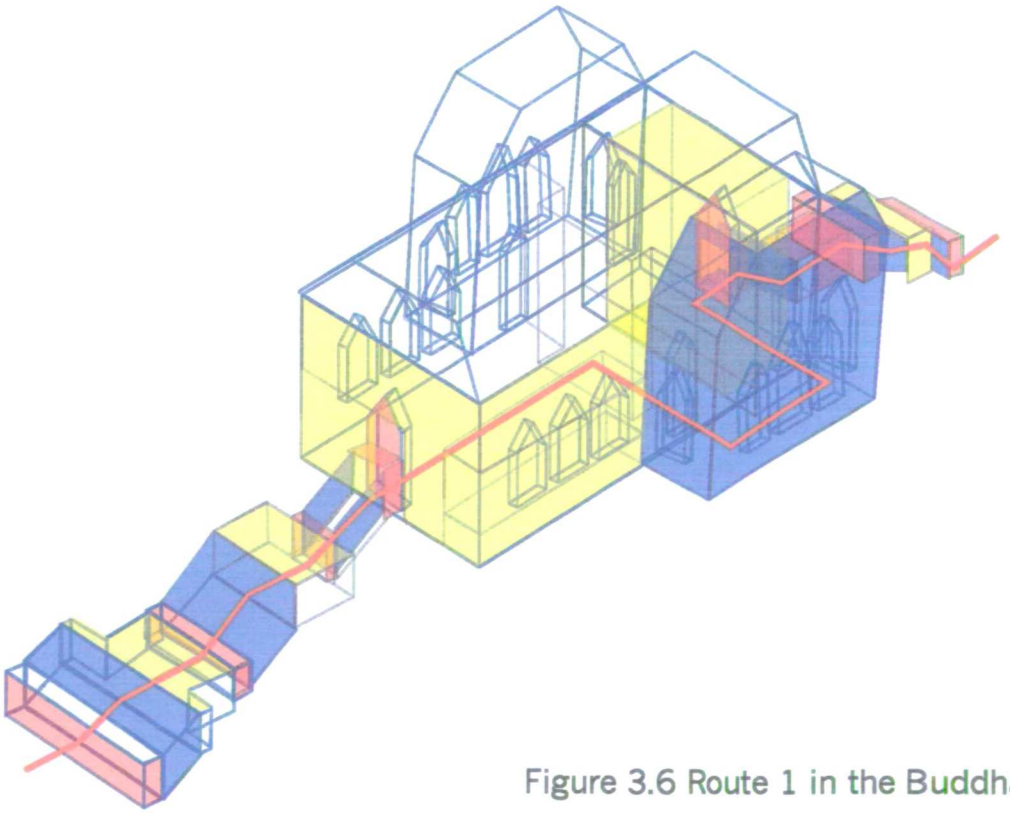


Figure 3.6 Route 1 in the Buddhapadipa temple

For this temple, d-place type space tends to provide the strong control and integration quality because it usually has strong integration and control values whereas the experience of place enhances control. Route 1 contains the highest number of spaces of all three routes (27/18/25). Despite all the rich experiences that the route has, it still has the lowest mean integration value of all routes. Therefore, further explanations apart from its structural properties need to be given. From actual observations it can be seen that route 1 is the most important route in the temple. It is the route that monks take from their residences to the *ubosot* for religious activities. Consequently, the route becomes quite concentrated and formal up to the front door of the *ubosot*. It is then milder once inside the *ubosot* and when it continues to the back door. This fact may contribute to the drop in integration value though not experience.

As an experience this route provides the best knowledge about the temple's space with 67% of its spaces as c-passage and c-junction spaces which theoretically relate to extensive experience. Furthermore, religious activities are usually more highly sequential in their course than that of non-religious ones. This means its set of spaces is treated differently, not in a sense of segregation from the system, but in terms of experiences. Consequently, this route contains the highest number of d-place spaces (6/1/1). It also has the highest number of c-passage spaces of all three routes (8/2/5) and as a result the highest number of c-junction spaces (9/2/9). The route has a mean connectivity of 2.6 which is equal to that of route 2 but less than route 3 (3.2). However, the route is highly permeable; there are 69 adjacent spaces which have the largest proportion of place type space (22%) and high portion of junction (34%) both indicate high connectivity.

Design analysis

Even though the route is strongly controlled by religious requirements, this does not mean a weak experiential dimension. On the other hand, it represents the highlight of the place served by the better-integrated ones. In the design analysis, functional and architectural elements of space will be related to the structural and experiential dimensions. There are 5 architectural elements and functions on this route which passes through many important functions of the temple including the most important one, the prayer hall which is the major element that makes up the architecture of the *ubosot*. It does not have any significant syntactic values, except for a relatively high control value (1.500). Its location in the system makes it a d-type while its function relates it to a place-

type space. It is one of the few d-place spaces that does not have a high integration value. The design of this prayer hall actually encourages movement to and from it because it is more open compared to other prayer halls in other Thai temples.

Stairs and terraces have high numbers of spaces in route 1 (13 and 7 respectively); some of them are even used as prayer space, and as gathering spaces for worshippers. In actual situations, the prayer space-terrace relation in space 5 always attracts large numbers of people to pray here. Stairs and terraces function mostly as circulation spaces as in most buildings and especially when they provide a sense of open space like those in this temple. What is different is that parts of them could be taken over by other functions and become powerful spaces, such as here where they are turned into 'place-prayer space' by social activities. In conclusion, it seems that route 1 contains both focused activities and distinct experiences which may suggest more segregation from the whole system than the other routes, as reflected in its low integration value. However, 'to isolate' could as well mean 'to emphasise' which is how this route achieves the best recognition in a religious architecture such as this one.

Route 2

This route, together with route 3, represents everyday experience or non-religious experience at the temple. This involves only the upper and lower terrace spaces which are connected to each other by three sets of stairs. Traditionally, terraces in a temple are used as transition spaces between public and religious spaces. Here at the Buddhapadipa temple, the terrace is often used as a public space since it is connected to all important facilities of the temple. Route 2 is the movement around the lower terrace space starting from space 5 facing the *ubosot* and proceeds to the right hand side. It makes a full circle arriving back at the space in front of the *ubosot* (Table 3.7). This route represents the most complete picture of the *ubosot* and the terraces and is very popular among tourists but not necessarily among regular worshippers.

Route 3

This route starts from entrance 3 and intersects with route 2 at space 41 and continues along the upper terrace, past the front door of the *ubosot* then down to the lower terrace. At space 13, this route intersects with route 1. It intersects with route 2 again at space 43 and then proceeds to the end at entrance 4 (Table 3.8). People use this route either to

reach the front of the *ubosot* in order to meet other people or to pray without going inside. They also come from both directions, from entrances 3 and 4 and quite often go from one to the other. The route represents one of the most common journeys people make at this temple. Routes 2 and 3 are all about movement on the terraces which act as multi-purpose space. These spaces on terraces will occasionally be used for ritual events that involve circular movement around the temple. However, these routes are normally known to people who use it as non-religious spaces especially when compared to the *ubosot*'s space and route 1.

Theoretical and syntactic analysis

The high integration and control values of routes 2 0.686) and 3 (0.617) correspond with actual observations that confirm that more people use the lower terrace since it is a very efficient way to go around. Route 2 has the highest mean connectivity of all routes (2.6/3.2/2.6 reflecting the efficiency of the terraces in this temple as a powerful means of spatial integration. The lower terrace contains a distinct number of d-passage type spaces (10). d-type space contributes to the high value of integration while passage-type space contributes to quality of movement and experience which suggests less control. The contradiction between d- and passage-type space is that while d-type usually has high control value, passage-type provides expansive experience. For example, highly integrated spaces 9, 11 and 32 are d-passage type spaces (0.714, 0.693 and 0.688 respectively) which have high control (1.083, 1.167 and 0.833). However, when they are together as one 'passage' the effect becomes weak because there are many choices along the way (9 connectivity). This suggests that when d-type spaces become a passage they release less focused experience and more choices than, for example, b-passage type spaces which are more direct and straightforward experiences.

Route 3 has a high number of d-junction spaces because it passes through four stairs where d-junction spaces are concentrated. The same as c-passage and junction spaces, d-passage and d-junction spaces are closely related; the terrace has 4 d-passage and 6 d-junction spaces. In both routes, d-passage space dominates the terrace while c-passage space dominates the stairs. On route 2, space 5 is at the fulcrum point which generates and propels the movement on the terraces in both directions. Therefore, it seems that the d- and place based relations influence the 'dynamic' effects in a spatial configuration.

In general, c-passage relation provides an extensive experience whereas d place relation seems to provide focused experience. They are both seen as very important relations that make this temple how it is. Junction and passage are usually affected by each other while place is a more independent experience. For example, in route 2 where d-passage dominates (10 spaces) there are five spaces with junction experience and only one place-type space. In route 3, there are 10 passage and 14 junction with one place-type. It seems that passage and junction in routes 2 and 3 are controlled by d-place. In this temple, junction generally has a lower integration value than passage except in route 1. In conclusion, the d-passage dominated route 2 is direct and offers all around experience with the highest integration values and connectivity. Route 3 is dominated by c- and d-junction type spaces suggesting a sequential-like experience of many functions. The route has the highest control value because of its straightforward nature as a carrier.

Design analysis

Route 2 is the most free-flowing route (Figure 3.7). Every space on the route functions as circulation on the lower terrace, except space 5 which is the main prayer space outside the *ubosot*. This is a phenomenon that is increasingly visible in Thai temples since it is quicker and less complicated to pray outside the crowded *ubosot*. However, the original design, as in other Thai temples, was not necessarily and intentionally made to accommodate this contemporary demand of the worshippers. Only because of the 'dynamic' nature of spatial configuration can such an adaptation be absorbed and work well for the whole piece of architecture. Practically such a location is very popular with the worshipper not only for symbolic reasons but also for structural and experiential reasons. The multi-angle design of the terraces creates the architectural 'gesture' that suggests an orientation point for people. Consequently, many temples pay more attention to this space by providing greater symbolic value to its experiential dimension, or better architectural elements to its functional dimension.

Many people use the terraces as a way to move quickly from one entrance to another; others use it as the way to the *ubosot* or to learn about the temple as a whole. On route 3 all non-religious activities such as talking or greeting are very brief and generally happen at spaces 5, 13 and 61 which are also on route 1. Route 3 takes people from the main public entrance to other important parts of the temple passing through another fulcrum point which is space 13 on the upper terrace. It is the fastest way to get inside the *ubosot*

and thus the most popular route for regular worshippers. Its course is more focused than route 2, as we may detect from its high control value. It is another way to reach the *ubosot* with a good mixture of choice and efficiency, although not much flexibility for occasional visitors (Figure 3.8).

In conclusion, non-religious activities on routes 2 and 3 seem to have a stronger global effect than religious ones on route 1 in terms of the structural dimension. They are globally and locally well integrated among themselves and also with religious activities. It seems that route 1 is very powerful locally and sequentially, which is reflected in its less global impact. The terrace space contains a high degree of choice as a result of the high number of d-passage as well as c-passage spaces that are usually dedicated to circulation. When it intersects with religious activities which have more definite characteristics, it seems to produce key spaces such as d-place spaces that usually accommodate special functions. These special functions encourage more movement to and from them as well as being significant architectural elements.

Even though route 1 captures most of the temple's quality, it would not mean anything without the other two routes since the existence of the temple is conceived by people as the object 'as-is' not as a combination of routes or any other things. In this way, designers may work on their ideas by having some frameworks to follow for that, to use the Eisenman analogy, a temple or t-e-m-p-l-e, for example, can be achieved as:

t-E-m-p-l-E or T-**E**-M-P-**L**-E or t- m- l -e, etc.
e- p-

It seems that it all comes down to the idea of relations that make architectural sense in order to put an end to the arbitrariness in design. To fully understand a building, the right balance among structural, experiential, functional and architectural-element dimensions is needed, as a piece of architecture is the interrelationship of all these properties of space. The final analysis of the research methodology will therefore focus on the relations among different properties conceived in architectural space and among sets of relations themselves.

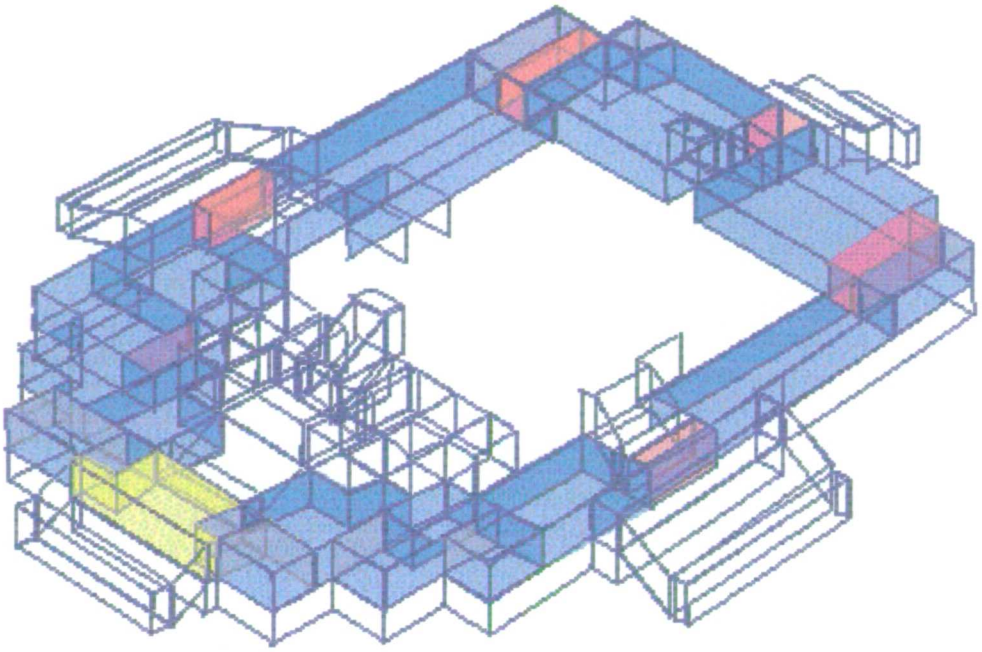


Figure 3.7 Route 2 in the Buddhapadipa temple

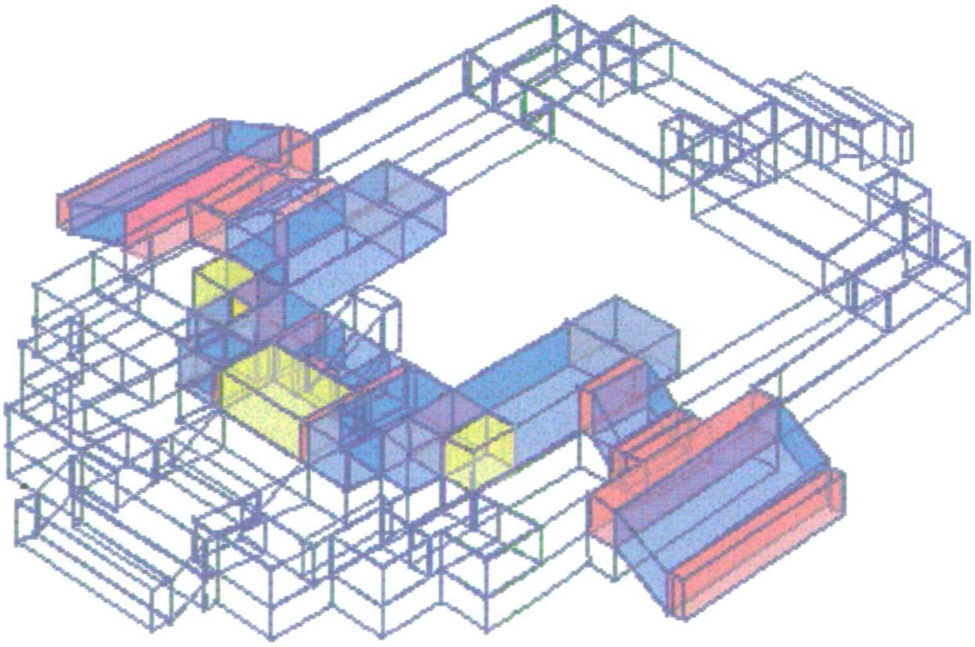


Figure 3.8 Route 3 in the Buddhapadipa temple

3.2 The interpretation

Numerical data: Tables 3.9 (p.107) and 3.10 (appendix)

Graphical data: Figures 3.9-3.10

The final discussion concludes the process in which space evolves into architectural reality. First of all, a common understanding of the investigation needs to be established. The two levels of investigation: abstract and physical are the platforms where all relations take shape. All relations exist under the rule of intelligibility of a configuration at an abstract level and under the conception of architecture at a physical level. Having two levels of investigation enforces the relations of theory and design and will make the evolution of space into architecture clearer which also makes any relations found as two-way relations; that is they can be realised in reference to one another. In this way theoretical understanding can become practical and vice versa. With this generic framework, the detailed investigations continue.

The first step is to look at the relations that have been acquired from the different properties of space. The investigation starts from generic relations among spaces within a spatial configuration to specific relations in specific pieces of architecture. The generic relations of space are those that are formed at the abstract level prior to any specific case. They are seen as standard properties of architectural space. At an abstract level, the structural dimension of space illustrates how spaces are related to one another in a system such as a-b-c-d-type spaces. Another generic relation, the experiential dimension of space, illustrates how spaces are related to people's experience inside architectural space in general; they are passage-, junction- and place-type space. These two properties are illustrated at an abstract level through the justified graph as in Figure 3.4.

The second step is to look at space-relations at a physical level; that is the level of how it is actually conceived by people. At this level, architectural space acquires meaning from its functional and architectural-element dimensions; space becomes more specific and more concentrated at a local scale. In this way the physical level is governed by the rules of the abstract level while the origin of abstract level is the translation of the physicality of the object in question. The interaction between abstract and physical levels is seen as spontaneous and is a two-way relation as presented in table 3.9.

Relation analysis transcends the other analyses because of its capacity to enable explanations of data from all dimensions and in practical angles at a global and local scale. To conclude, the aim of this analysis is to find out:

1. if certain relations among structural, experiential, functional and architectural-element dimensions of architectural space exist.
2. in what way these relations have effects on the socio-cultural aspects of the selected built environment.
3. if it is possible to conceive these relations as design strategies.

The following relations analysis deals with objective 1 in which different properties of a space will be compared. The relations between certain space types, between certain architectural elements and functions and across all properties are expected to be more visible. In parallel to the discussion of abstraction-to-architectural reality process, these relations will be discussed in terms of their design logic/strategies that represent two parallel qualities in the instrumentality of architecture. Objectives 2 and 3 are then covered. The genotype of their relations is therefore bound to cover the logic from global to local understanding of space and from body movement to design in architecture.

Relation analysis

It seems that certain properties of space contribute to what we called 'quality' of space. When one is in a space, structurally, one would love to be integrated with that space and other spaces as much as possible. Another index for spatial quality is the experience that provides one with 'good and interesting' feelings and thus makes a difference in the same activities. One experiences space through one's movement in relation to spatial structure absorbing and creating the characteristics of passage, junction, and place as a consequence. Function, together with its envelope, completes people's appreciation of moving and being in architectural space. In other words, movement is the most fundamental property of space and of social activities.

The study of the Buddhapadipa temple's space produced some information about these relations that could be seen as information about space in general as well as for the Thai temple. We start by looking at the relations at an abstract level (Table 3.3):

1. Globally, the order of mean integration is place < passage < junction with exterior: 0.615 < 0.614 < 0.600 and d-< c-type: 0.655< 0.582.
2. d-passage< d-junction< d place< c-passage< c-junction< c-place: 0.661< 0.654< 0.635< 0.583< 0.582< 0.574.
3. And in terms of number of space: c-junction< c-passage< d-passage< d-junction< d-place< c-place: 25< 21< 14< 8< 4< 2.
4. In terms of connectivity: c-junction< d-passage< c-passage< d-junction< d-place< c-place: 50< 44< 40< 32< 10< 4.

d-place type has a relatively high impact (0.635) on the system with only a few spaces (4). The majority is the c-type relations which have 48 spaces and 96 connections versus 26 spaces and 84 connections of d-type relations. What do these facts say about the system and the relations themselves? Plainly, they suggest that d-place may be the most important relation and c-type relations are the most common. Theoretically, we can focus on these two facts.

In short, d-place relation provides a high integration value, not the highest on average but highest in individual spaces and also strong control both structurally and experientially. c-passage relation provides moderate integration values and is not necessarily strong in controlling experiences, which means it might provide 'good and interesting' ones. c-junction relation provides moderate to high integration values and relates very closely with c-passage. It could also be a part of a 'good and interesting' experience. d-passage relation with its strong syntactic values provides high quality of spatial structure and perhaps experience. c-place relation follows Hillier's rule of c-type space and c-type complex that creates segregation. However, in the analyses and observations this relation provides good control over experience and has a moderate integration value. Further analyses and observations are needed since in this temple there are only three spaces with this relation. d-junction relation provides a high quality of structure as it usually relates to d-passage. There are no relations based on a- and b-type space in this temple; they need further analyses and observations in other examples.

Next, we look at the relations in their architectural reality (Table 3.5):

1. The order of mean integration value is prayer space< circulation< entrance< prayer hall< foyer: 0.663< 0.608< 0.594< 0.530< 0.503 and terrace< stairs< hall< doorway< hallway: 0.647< 0.588< 0.517< 0.489< 0.481.
2. prayer space-terrace< circulation-terrace< entrance-stairs< circulation-stairs< prayer space-stairs< prayer hall-hall<foyer-hall< circulation-doorway< circulation-hallway: 0.754< 0.642< 0.594< 0.588< 0.574< 0.530< 0.503< 0.489< 0.481.
3. The order in terms of number of space is circulation-terrace< circulation-stairs< circulation-doorway< entrance-stairs = circulation-hallway< prayer space-terrace = prayer space-stairs< prayer hall-hall = foyer-hall: 41< 14< 5< 4< 2< 1.
4. The order of connectivity is circulation-terrace< circulation-stairs< circulation-doorway = prayer space-terrace < entrance-stairs = circulation-hallway< prayer space-stairs< prayer hall-hall = foyer-hall: 112< 28< 10< 8< 4< 3 (Table 3.10).

Prayer space and terrace are the strongest in terms of integration value as with its relation, prayer space-terrace. At the same time, prayer space-based relations are very few and have moderate to low connectivity. Circulation-terrace relation has the highest number of spaces and the second highest integration value with an extremely high value of connectivity. This is confirmed by actual experience, terraces of this temple are the most expansive architectural elements. But conceptually, circulation-or prayer space-terrace relations serve an indoor space with prayer hall-hall relation which has very low syntactic values. In short, prayer space-terrace and prayer hall-hall relations are both very significant in the temple, but, in contrasting ways.

In conclusion, circulation-terrace has the most expansive effect while prayer space-terrace seems to have an intensive effect. It seems to suggest that a specific architectural element has a direct relation with the structural dimension and influences integration values. In this case it is 'terrace' since every function related to it has a high integration value, but this is not the case when these functions relate to other architectural elements. For example, 'circulation' has a high integration value, which is a structural quality, when it relates to 'terrace' but not with 'hallway' (Table 3.5). It also implies that function might have a direct relation with the experiential dimension. This fact can be seen in the case of the most important function, prayer hall, which has almost the lowest integration value but has the richest experiential dimension in the temple.

In table 3.9, theoretical relations can be seen alongside architectural reality. The most visible relation is d-passage-circulation-terrace in 14 spaces. 58% of all relations are associated with terrace and about 95% of these relations function as circulation. 49% of circulation-terrace relation is experienced as passage, while the rest is junction. 46% of circulation-terrace relation is structured as c-type and 54% is d-type space. It is interesting that the most significant relation in terms of structural qualities is realised as terrace: d-place-prayer space-terrace relation has the highest integration and control value. These terrace-based syntax may be the main design strategy of this temple as we shall see in the next section.

Buddhapadipa temple: Relational syntax

Structural dimension	Experiential dimension	Functional dimension	Architectural dimension	Number of space (%)	Mean Integration/ control value
a	→0				
b	→0				
c	→passage	→circulation	→stairs	= 13 (17.6)	0.593/0.872
			→terrace	= 6 (8.1)	0.601/1.000
			→hallway	= 2 (2.7)	0.467/0.667
	→junction	→circulation	→terrace	= 13	0.632/0.705
			→doorway	= 5 (6.8)	0.489/0.967
			→stairs	= 1 (1.4)	0.526/0.833
			→hallway	= 2	0.495/0.833
		→entrance	→stairs	= 4 (5.4)	0.594/0.750
	→place	→prayer space	→stairs	= 2	0.574/1.000
d	→passage	→circulation	→terrace	= 14 (18.9)	0.661/1.143
	→junction	→circulation	→terrace	= 8 (10.8)	0.654/1.313
	→place	→prayer space	→terrace	= 2	**0.754/2.334**
		→prayer hall	→hall	= 1	0.530/1.500
		→foyer	→hall	= 1	0.503/1.500

Total space = 74 + 1 exterior space (d-place)

Table 3.9: Relational syntax of the Buddhapadipa temple.

d-place-prayer space-terrace is the only relation that has its mean integration value at 0.7 while if it is realised as c-place-prayer space-stairs or d-place-prayer hall-hall, the integration values go down to 0.5. The most important function in this temple space 30 is a d-place-prayer hall-hall in its full syntax. Despite the d-place relation, which normally produces high integration value, the prayer hall of this temple is not very well integrated with the whole even though a hall in its conventional sense usually suggests an

assembling place. This architectural element seems to have only a small effect on the integration value. However, in reality, it is the most important element in the temple.

Other syntaxes that stand out from the rest are those that have kept their relations exclusive to one arrangement. They are seen as the syntaxes that may be unique to such a building or type of architecture. The strongest relation in this consideration is c-place-prayer space-stairs relation in two spaces that are parts of the front and the back stairs of the temple. The other syntaxes are d-passage-circulation-terrace and d-junction-circulation terrace relations. 14 spaces or 54% of d-type space is related to this passage-based syntax. d-junction is also only related to circulation-terrace which represents about 31% of d-type space in this temple. This degree of intensity in relations seems to contribute to the relatively high value of the syntax's integration compared to other d-passage/junction syntax (Table 3.9). Therefore, apart from the number of spaces and syntactic values, it is very useful to look at a syntax in terms of its consistency, e.g. c-place-prayer space-stairs, and uniqueness, e.g. d-place-prayer hall-hall.

Design strategy analysis

Firstly, when these relational syntaxes are used to construct a building; that is, when they are seen as design strategies, the abstract information from the analyses will have to be matched and tested in the socio-cultural sphere. A building starts off as a pure object but to turn such an object into architecture one needs to make use of it and deal with orders prescribed in space according to social needs. As a result, architecture exists because one realises a succession of activities and events through use over a period of time. Thus, there is no way to understand architectural space without going through specific sequences in its space; this is the difference between architectural space and other space. We already have some idea of what specific function would be suitable for a specific kind of envelope because we understand its socio-cultural frameworks and how we can move in such a space. Consequently, we are able to recognise and use different parts of a building without constantly needing some kind of instruction.

The Buddhapadipa temple serves religious activities similar to the traditional Thai temples in Thailand. In this way, we can assume that its design strategies are influenced by more or less the same socio-cultural frameworks as those in Thailand. Therefore, to understand the design and its effects, firstly, traditional Thai rules and customs are seen

as the basic approach in addition to a general understanding of architecture. Secondly, to analyse design strategies, we have to look at how the piece of architecture is conceived of as a whole from the relations that are present in its space and how they are arranged in the system, especially in important parts of the architecture. Therefore, information in table 3.9 and route analysis become the sources of the design strategy analysis.

Thirdly, in designing a piece of architecture, the most basic consideration that differentiates space in the architect's mind is the issue of indoor and outdoor space. Most buildings have these two parts, especially in an environment such as Thailand's. Such design objectives have been encouraged, as they are seen as good strategies for a building (Jencks and Kropf, 1997). In short, the criteria from which the design strategy analysis orients itself are socio-cultural aspects, part-whole relationships and indoor/outdoor space. The main objective of the analyses is the relational knowledge of relations in different dimensions of architectural space. This concerns not only the obvious, such as which element in one dimension is which in other dimensions, but more importantly, why this is so and how it is used as design strategy.

For example, at this temple, d-place-prayer hall-hall and d-passage-circulation-terrace are two important relations in terms of their numerical significance; one is the lowest and the other is the highest, respectively. In this way, their relationships to the whole are very polarised in theory. In terms of socio-cultural importance, d-place-prayer hall-hall is absolutely the most important. However d-passage-circulation-terrace may not be any more important than other terrace-based relations in action. And surely, d-place-prayer hall-hall is an indoor space while d-passage-circulation-terrace is an outdoor space. We have seen from earlier analyses which relations seem to be the significant ones, but the relations among these significant relations and others are yet to be explored. After all, they are all connected in one complex string, which seems to be configured by the designers' awareness of socio-cultural, part-whole indoor/outdoor strategies.

Socio-cultural strategies

In general, temples in Thai society have the idea of 'meeting place' rather than 'house of God' (Turner, 1979). Basically, a Thai temple has two important parts: the *ubosot* and the terraces. According to this concept of 'meeting place' its design discourages dead-end space. As a result, there are no a- and b-type spaces in this temple. However, there is a

possibility that such a design could incorporate the use of a- or b-type space when there are 'pocket spaces' which people use as a means of orientation during their movement. The function of 'orientation' explains movement in relation to location, referring backward or forward in time, and thus strengthens three dimensional relations in architectural space.

The design strategy used in the temple is meant to emphasise the d-place-prayer hall-hall by shielding it from the rest, using the series of pocket spaces such as hallway, doorway and stairs. The idea of 'climbing up' the c-passage-circulation-stairs to get to the Buddha image inside the *ubosot* is prevalent in Thai temples; it theoretically and physically reflects the idea of heaven. People, however, can move freely to and from the *ubosot* through both front and back doors. The movement at this temple is freer than in other Thai temples because there are clear c-passage-circulation-hallway spaces 68 and 69 that connect the d-place-prayer hall-hall to the back d-place-foyer-hall space. This part of the design strategy is unusual since in other temples only monks or the temple staff access the space behind the Buddha image to prepare a ceremony.

All terrace spaces are designed for movement using either c- or d-passage-circulation-terrace relations. It becomes clear at this temple that the 'carrier' c-passage-circulation-terrace is in control in the system rather than the 'accelerator' or authoritative d-passage-circulation-terrace. This is because c-based relations are used to connect different parts of the temple together and occasionally provide places of reference for worshippers, such as spaces 3 and 61. d-based relations are used as the complements of c-based ones in that they provide 'accelerating' effects to social movement at specific places such as spaces 13, 11, 48, 58 where people are usually at the start or the height of their moving experiences. This is because the terraces and stairs are designed to deal with large crowds that constantly moving. It therefore needs a strategy which supplies 'dynamism' but at the same time does not lose control of the crowd.

Part-Whole strategy

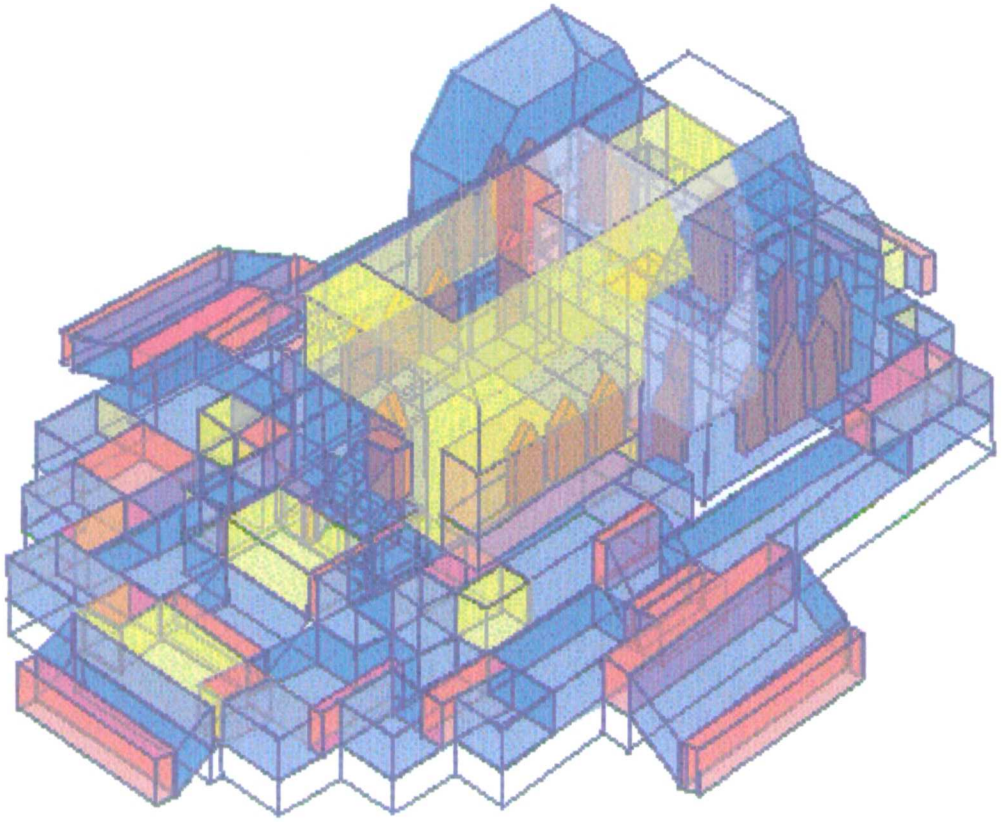
If we look at a piece of architecture as an object, its existence comes not only from socio-cultural aspects but also from architectonic aspects. Each architectural element has a relation that makes a unique contribution to the whole and is seen as intention in design which then evolves into a genotype in specific types of architecture. A relation is a

part that has its own logic from the way it is located in a whole. In this way, it is a strategy that can be repeated, modified or changed to achieve a schematic whole. The part-whole strategy is about the way a whole is built up by the specific relations of parts. These ideas do not reside in objects but in relations.

At the Buddhapadipa temple, we have seen that d-place-prayer hall-hall is very important which is obvious in every way. Other interesting relations are d-place-prayer space-terrace in terms of its integration and control value (Table 3.9), c-passage/junction-circulation-terraces in terms of their overall influence on the whole (justified graph, Figure 3.4) and d-passage-circulation-terraces in terms of their number (Table 3.9). Now if we look at them as if they were parts of a long string of whole relations in a piece of architecture, we might want to ask the questions 'what is the structure of these relations?', 'how do they organise themselves among one another?' and later 'are there any concepts of genotype involved?'

Figure 3.9 shows all relations of the temple in their locations as they are composed into architectural reality. Apart from numerical data shown in table 3.9, it is normally useful and necessary to see these relations in practice if their strategies are to be understood. From route analysis, we see that a piece of architecture is conceived as parts and these parts merge into one another through time. It is the synchronisation of our spatial conception and body movement within a certain zone framed by certain interests in social activities. At this temple, the lower terrace, the upper terrace and the *ubosot* are seen as three instruments which define the mechanic of the whole space.

It is often claimed that design in Thai culture, from small objects to the built environment has a high degree of dynamism (e.g. Kalayanamitr, 1977). This is the result of the careful considerations in 'spatial conception and body movement' as a design strategy. At the temple, space is vigorously spun around by d-passage-circulation-terrace having c-passage-circulation-terrace/stairs relations as the spinners as well as the speedometers. Imagine a wheel with four dials, the major dial is of course the one at the entrance 1. Here the dynamism of the place either comes slowly to a stop, e.g. spaces 31, 10 and 8 if one imagines a clockwise circumnavigation, or speedily starts to take off again, e.g. spaces 9, 11 and 32. This is why some spaces on the terraces, e.g. spaces 5, 13 and 58, play a crucial role in the design strategy of the whole place.



Passage
Junction
Place

Buddhapadipa Temple, Wimbledon, London

Figure 3.9 Space of the Buddhapadipa temple

The whole temple would spin around and around if there are no dials; c-passage /junction-circulation-stairs relations perform this function in order to provide both stability and dynamism to the whole. However, not all of them perform the same role. Some play the stopper rather than spinner. The *ubosot* in this temple acts as a fulcrum where all the movement is generated and stopped. Its design balances the dynamic forces on the upper terrace by using its c-junction-circulation-stairs relation as a 'pin' effect, putting a stop to the relentless movement before sequencing it into the *ubosot* space. In here, the movement is completely stopped, not by a-based relations but by a d-place-prayer hall-hall relation. From the justified graph, c-based relations are in better position and control than d-based relations even though its number of spaces are fewer than those in d-based relations.

Indoor/Outdoor strategies

The relationship of these two parts may be one of the most noticeable characteristics that makes each piece and each kind of architecture different. Traditional Thai architecture has emphasised this strategy throughout its history in both temples and houses in order to achieve a dynamic configuration of architectural space. It is also interesting to note that in traditional Thai architecture the so-called dynamism is achieved through the configuration of void more than through the plastic manipulation of form in architectural elements. In this way, its overall characteristic is quite simple in terms of massing. However, when it comes to detailed treatments it is not simplicity that the Thai have employed but the elaboration of profiles which is believed to further enhance the dynamism of the whole (Kalayanamitr, 1982). Great care has also been given to the design of the point where outdoor and indoor space meet.

At this temple, the outdoor and indoor parts are clearly marked and easy to differentiate. This is the first strategy: clarity. It is not so much an issue of sacred and profane, or public and private in the case of houses, because in a Thai temple everywhere is declared sacred while in Thai houses, the *chan*, the big terraces, are just the extension of rooms and vice versa. In the Buddhapadipa temple, there are 12 interior spaces out of 74 spaces (16° o) which are defined as the *ubosot* with d-place-prayer hall-hall relation in the main space. It is connected to the rest by two c-junction-circulation-hallway and one c-junction-circulation-doorway space. The second strategy is that the prayer hall is protected from being directly connected to the outdoor space by the design of deep

pocket spaces at doorways or windows which is not fully employed in this temple. The interior space of this temple is well connected from front to back through many spaces that are specially dedicated to the circulation function. Moreover, the walls that envelop the d-place-prayer hall-hall continue into c-passage-circulation-hallway spaces and carry with them people who have been observing the story of Buddha that is painted in sequences on these walls.

The meeting points of indoor and outdoor space are the third strategy for consideration. The front of the *ubosot*, is done in a more elaborated way than at the back by differentiating the space at the end of c-passage-circulation-stairs as the doorway space, while the back stairs space directly meets with indoor space. Beyond this set of stairs-based relations, the space of Thai temples is usually defined as outdoor space on the terraces. The terrace space in Thai temples and houses is usually designed to have a three- dimensional volume by having different levels. The effect is much stronger in temples since it uses a multi-terrace strategy to emphasise the three-dimensional sense of outdoor space. The strategy is to put the upper terrace at about eye-level thus creating the overhead-plane effect. There are other ways to achieve this effect without using multi-terraces, such as having a cloister around the terrace or having other elements like pavilions on the terrace. Thai houses use this multi-element strategy to give volume to their outdoor spaces.

At this point of the analysis, the concept of spatial configuration has been seen through a sequence of 'filters' that finally complete the circle of relations in architectural space, from abstraction to architectural reality. In other words, the ideas which are oriented towards the creation of objectivity have turned back to govern the way space is configured and vice versa. The concept of strategy in design is architectural reality as much as a piece of architecture is. The chapter is written according to theoretical analyses and actual observations using the information of space from only one temple; it is meant to show how the research methodology works rather than to draw any stable conclusions. Some useful and provocative conclusions are expected as the research proceeds and examines many more pieces of architecture. More examples will certainly provide more stable conclusions leading to a better understanding of relational syntax in theory, design and use.

3.3 Conclusion

There is no intention to arrive at concrete facts concerning the nature of relational syntax at the conclusion of this chapter, such a conclusion will be better done after the analysis of the selected examples. Here it attempts to provide a clear picture of how such conclusions are possible. The following flowchart is the conclusion of the research methodology as outlined in this chapter (Figure 3.10).

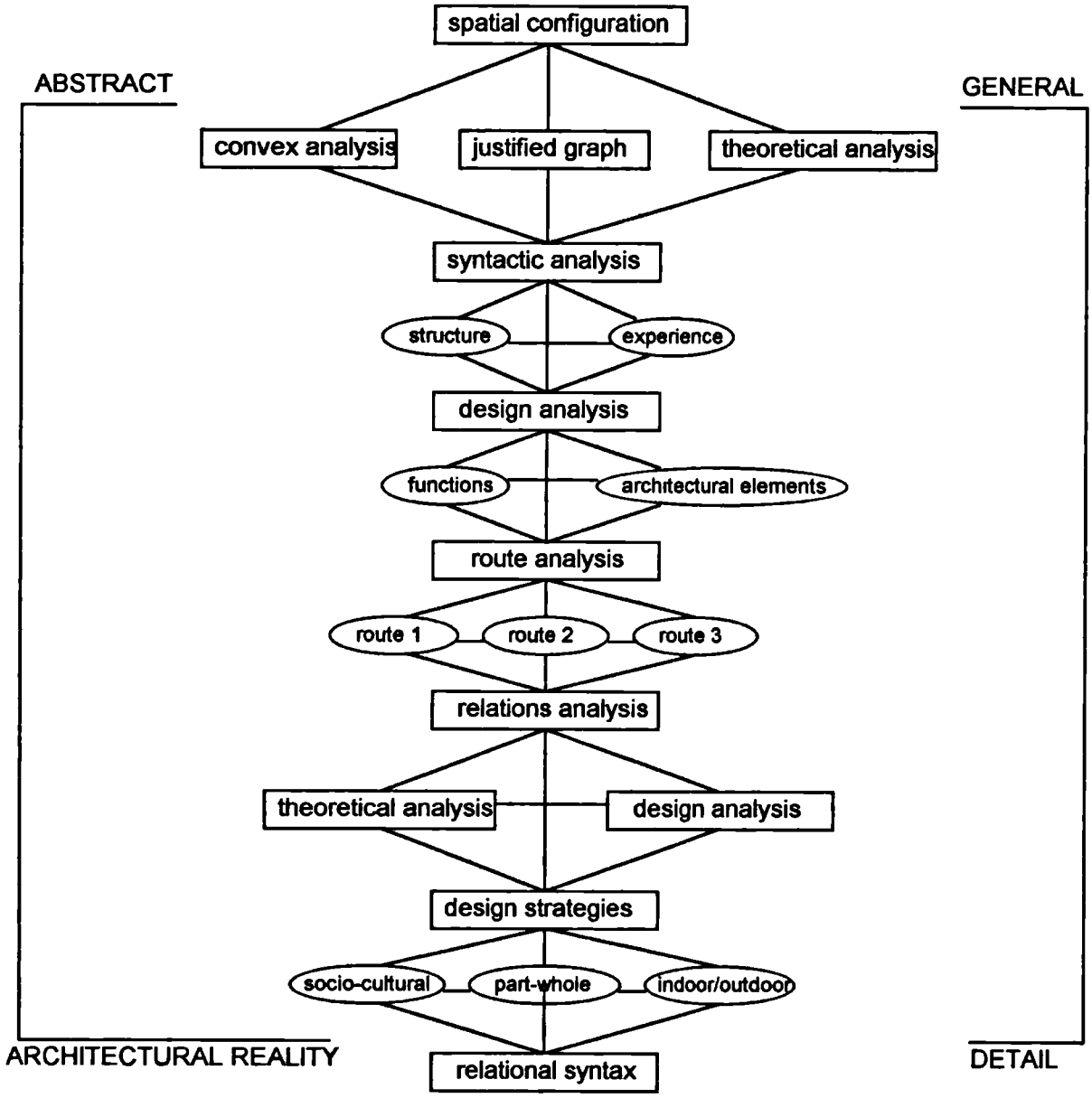


Figure 3.10. Structure of the Research Methodology

'In the previous example of a house my perceptions could begin with the apprehension of the roof and end with the basement, or could begin from below and end above;...from right to left or from left to right. In the series of these perceptions there was thus no determinate order specifying at what point I must begin in order to connect the manifold empirically. But in the perception of an event there is always a rule that makes the order in which the perceptions (in the apprehension of this appearance) follow upon one another a necessary order.' (Kant, 1929:221). As Kant has pointed out, the process of abstraction-to-architectural reality also needs a necessary order but not a one way order. The logic of relational syntax is to be seen as a bi-directional reasoning; that is, it works as an instrument and not like a value-laden sentence. Its instrumentality is the benefit of the mechanical nature of its relations, in that each part of the instrument stands for itself while it takes part in the whole operation as an interdependent item. As a result, the intrinsic quality of the instrument can be seen as the configuration of the extrinsic quality, like a mirror and a reflection. An object, thus, becomes more transparent as to what it is, what it is for and what it does.

Let us understand that the research is articulating a theory that emphasises the application of use in design methodology which is a process of creative freedom. In this way, theory is not a framework to be strictly followed but rather an 'instrument' used to concretise the imagination. It is instrumental not authoritative. We need to discuss the general logic of relations as much as how a particular strategy is used in designing a particular kind of building. These knowledges complement each other; without a general understanding we cannot achieve a particular one while without particular strategies we are going nowhere near anything useful. The next chapter will turn from the Buddhapadipa temple in London to the selected houses and temples in Thailand.

4. Traditional Thai Architecture: Houses and Temples

Architectural space depends on relations among its dimensions of structure-experience-function-architectural elements in order to express its identity as built environment in general, and in a specific culture and society. This general argument is further emphasised and made clear by using the most fundamental building types: houses and temples from Thailand which present both generic and specific settings for the research. In this chapter, the theoretical and historical background of traditional Thai houses and temples are discussed followed by further discussions of domestic and religious lives in the Thai socio-cultural setting for a clearer understanding of each in relation to its built environment. The discussions are conducted separately between houses and temples in their own terms of theories, uses and designs. However, there is no doubt that they are influenced by each other. The selected examples will be introduced in detail with information from their plans and on-site observations.

4.1 Theoretical and historical background

There are several theories about where the Thai originated. Some believe they come from the southern part of China, from islands in the Pacific, whilst some believe that the Thai have always lived in the area today known as Thailand (e.g.: Rajadhon, 1968; Tambiah, 1976; Buabutr, 1977; Aasen, 1998). However, certain factors that have heavily influenced Thai culture and been associated with the design of Thai houses and temples are Buddhism and the concept of universe in the old Khmer civilisation. The foundation of traditional Thai architecture was laid in the reign of King Ramkamhaeng (1279-99) of Sukhothai when Buddhism was adopted as the national religion while Khmer and Mon culture had great influence on social life (Rajadhon, 1944; 1968; Ratanatassanee, 1996). A specific influence is the *Triphumikatha* or the Three Worlds Cosmography written by King Maha Thammaracha I of Ayuthaya in 1345 (Figure 4.1). All of these have remained essential alongside Chinese and Western influences of the late Ayuthaya period.

From before Sukhothai toward the half way point in the Buddhist's third Millennium (1999+543 = 2542), the timeline of traditional Thai architecture in relation to Buddhism (Ratanatassanee, 1996:23) can be illustrated as below.

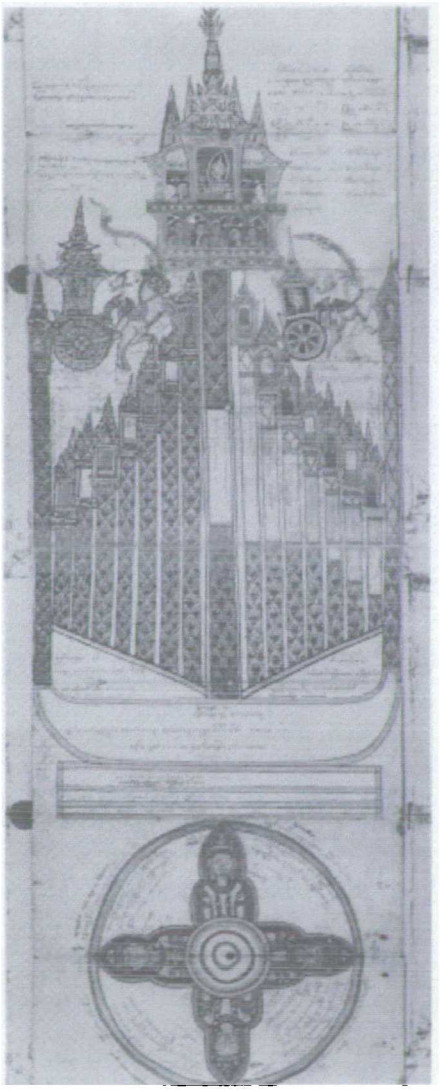


Figure 4.1 Tripumikatha (three worlds)

Prehistoric Thai

1. Thavaravadee period (43 B.C.-657)

Buddhism: Hinayan from India

House: no records

Temple: Indian-influenced architecture

2. Srivichai period (657-1157)

Buddhism: Mahayan from Java and Khmer

House: no records

Temple: Khmer-influenced architecture

3. Lopburee period (957-1257)

Buddhism: Mahayan and Hinayan

House: no records

Temple: Khmer-influenced architecture

Historical Thai

4. Chiangsaen period (1057-1557)

Buddhism: Hinayan and Mahayan

House: no records

Temple: Beginning of the Thai temple with Indian influence

5. Sukhothai period (1257-1357)

Buddhism: Hinayan and Mahayan

House: no records

Temple: Sukhothai style with Sri Lanka and Khmer influences

6. Ayuthaya period (1357-1757)

Buddhism: Hinayan domination

House: Ayuthaya style (which become to be known as the traditional Thai house)

Temple: Ayuthaya style with Sri Lanka and Khmer influences

7. Rattanakosin period (1757-present)

Buddhism: Hinayan

House: Rattanakosin style (heavily drawn from Ayuthaya style)

Temple: Rattanakosin style (revival of Ayuthaya and Sukhothai style plus Chinese and Western influences)

The formulation of Thai culture has a long history of adaptation and overshadows other cultures such as Khmer, Chinese, Indian, and Western. Despite its heterogeneity,

Thai culture retains traditional characteristics that are different from other neighbouring countries, those with similar influences, and the rest of the world. Thai culture is about variation and is dynamic in the sense that it becomes the logic of making things, as it has been shown in most of inventions by Thais (Kalayanamitr, 1977) (Figures 4.2-4.3). Forms are treated in order to achieve more dynamic space around them; spaces become distinct, as virtual forms in cyberspace architecture. This logic is inherited in language, epic and literature, music and dance, social behaviour, food and the built environment. A theory of dynamism derived from *Nam* (water) is the Thai preoccupation when dealing with environment, both the built environment and people, interestingly suggests the unique understanding of the Thai toward space and its configuration (Jumsai, 1989).

Traditionally, the idea of type in architecture in Thailand was much less rigid than those in the Western world. For example, there were very few designated places which were made specifically for public purposes; people went to temples to meet and learn and stayed at home to rest and do everyday activities. There were no agoras, piazzas or town halls for assembly. Entertainment events such as flea markets or outdoor cinema were organised at temples. Therefore, a temple assumed many roles including that of library and school (teaching took place outdoors or on pavilions). The monastery yard was used as cinema, marketplace and hospital (e.g. temple 1's massage place), museum and sometimes a political arena for community leaders to address to their people.

Because society did not go through a scientific revolution within itself, people placed their faith in supra-scientific knowledge represented in temples. People often celebrated special occasions such as birth, marriage or death at home and they worked in the rice fields close to home; the house is everything in such a society. Politics and colonialism were never promoted on a public scale; in this sense, people, including artisans, were very naïve about the power of the built environment as institutions therefore, buildings are seen more as an extension of life and less as monuments. The will to exercise power was greatly reduced by the lack of institutional concepts, the value of the extended family and the internal-self emphasis of Buddhism.

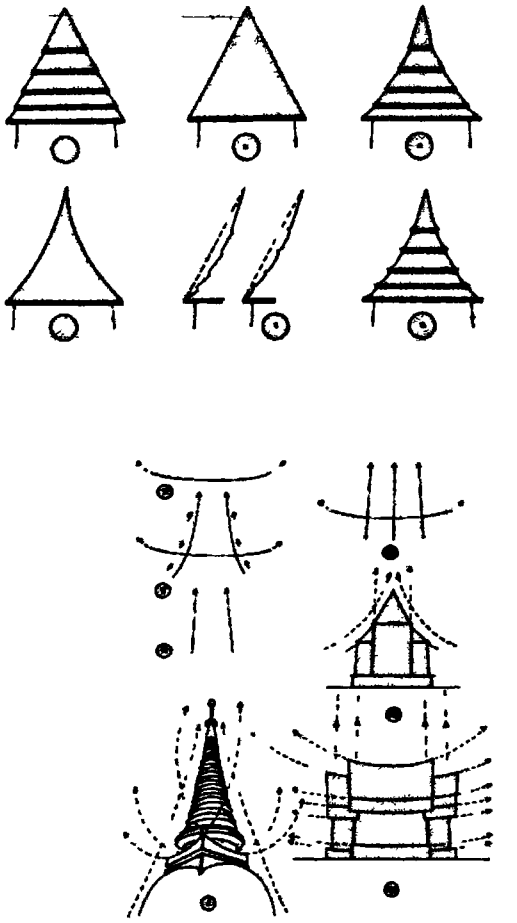


Figure 4.2 Dynamic design in Thai architecture (Kalayanamitr, 1982)

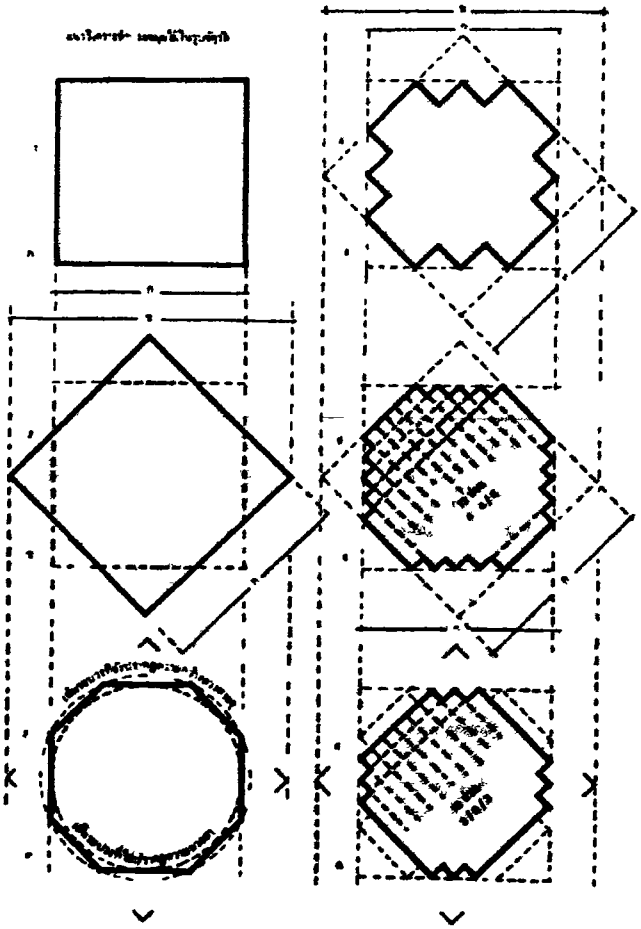


Figure 4.3 'yor moom' Thai design technique (Kalayanamitr, 1982)

Consequently, the philosophy of making the built environment in Thailand rejects the idea of taking control, and the will to exercise power was seen as something uncivilised. There were no serious missionary projects to spread Buddhism therefore, initially monks were not involved with the exercise of power. In the religious community, hierarchy in monkhood is mainly based on the teacher-student relationship. This anti-ruler-ruled relationship is dominant in traditional Thai society where home has the idea of the extended family while temples, freedom in Buddhism. This is reflected in the built environment where matter gives way to the abstraction of rules and customs in space.

Both houses and temples embody the idea of 'open-plan' (Figures 4.4-4.5). They both use terraces as one of their most important elements where people are free to walk around because everybody is fully conscious of the abstraction 'in the air'. There is usually no need to put walls everywhere; small differences are usually enough, something like a step or pattern on the wall. These abstract configurations in space are fully three-dimensional ones, for a step on the ground signifies the whole volume of space as having a different abstraction of rules and customs. While people can be seen to have a lot of freedom in spatial configuration, they are very careful about their movements as well. These abstractions are embedded in space, and small details; however, it is expected that people will treat them seriously. Thai people tend to be modest about making a space a special one. It is not reasonable to impose rules on many places and end up having most of them violated. As a result, houses have units that can be shut off from the rest of the compound while temples usually restrict the main ordination halls while the rest of space is left open.

In chapter two, the concept of *mandala* and three-world cosmography were discussed as being preconceptions that seem to shape the spatial configurations of traditional Thai architecture. The idea of *mandala* is widely used as a planning tool in Southeast Asia (Tambiah, 1976) while the three-world cosmography is used in the planning and design of traditional Thai architecture (Kalayanamitr, 1982). The similarity between the two concepts lies in how they make use of the major cardinal points. Portraying as the 'five- and nine-unit systems' (Figure 4.6), the diagram represents the design of the *Negri Sembilan* state which is a system of clans, chiefs, and territorial divisions. It is here that the idea of 'district' and 'veranda' was firstly made evident (Figure 2.4).

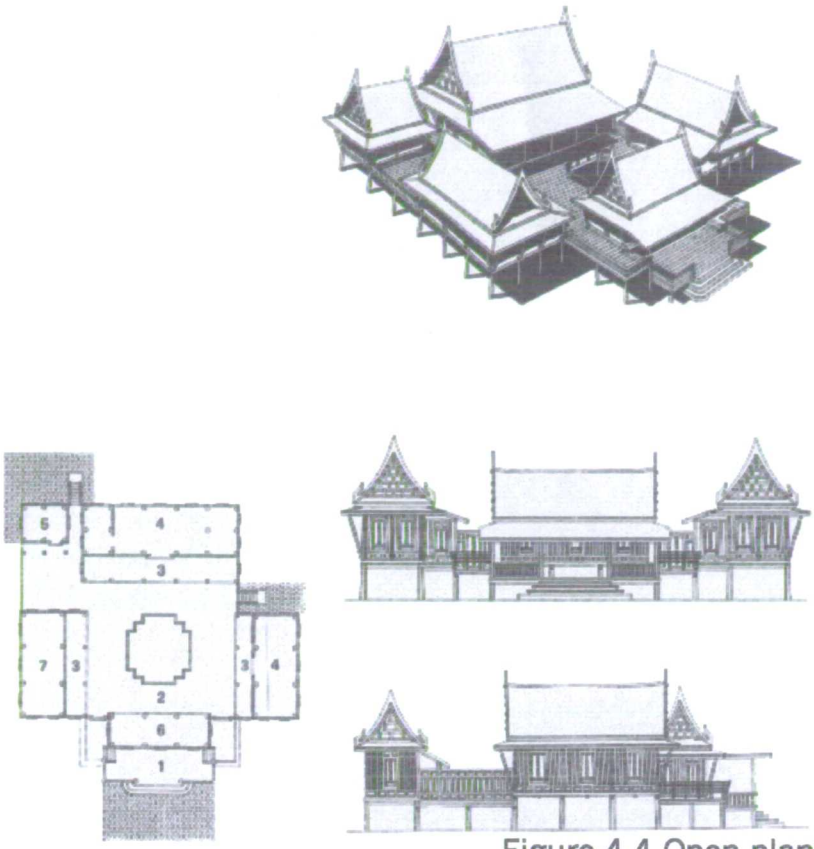


Figure 4.4 Open-plan Thai house (Warren, 1989)

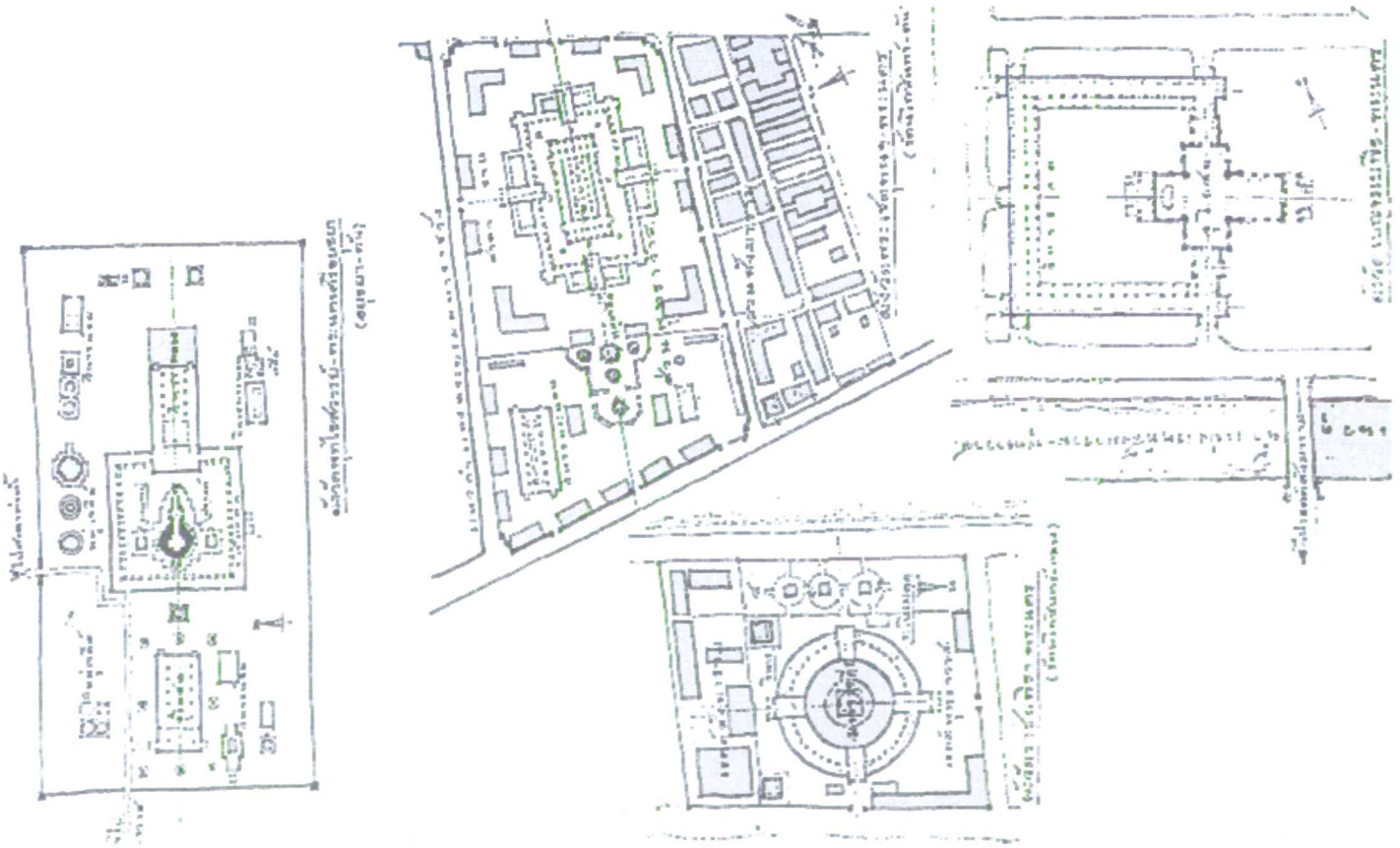


Figure 4.5 Open-plan Thai temples (Ratanatassanee, 1996)

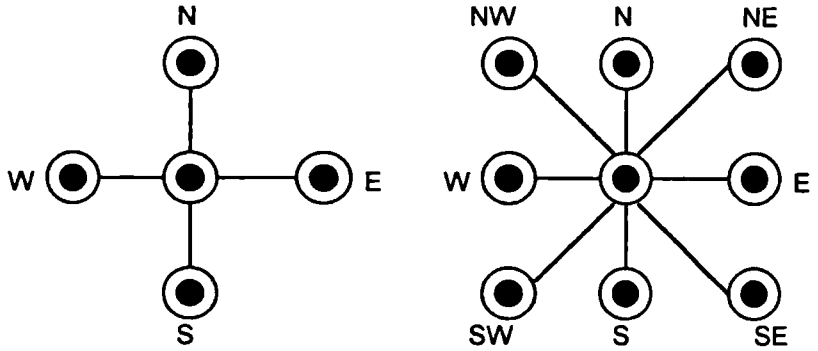


Figure 4.6. The five unit a) and nine unit systems (b)

The centre of both systems is the place of power representing the king, capitol or the Meru mountain. When this location is related to architectural elements in Thai houses or temples, it usually functions as a meeting place such as the *chan* in a house and the *ubosot* in a temple where family members or Buddhists assemble and thus the political status of the chief is strengthened. For example, the status of the father becomes more emphasised when linked to children and wife or when Buddhists conduct religious activities in front of the Buddha (image) reflecting political ideas that might have given shapes to such spatial configurations. The concept of three-world cosmography provides not only the framework for planning but also for designing architecture since the concept provides both two and three-dimensional guidelines (Figure 2.5) as can be seen in the design of plans and sections in Thai houses and temples (Figure 4.7).

Houses and temples are the centres of life in a society. It is not the question of their origin that is important but of their impacts on people's conception of architecture because it defines our preconception of architecture in more or less the same way as cosmography does for houses and temples. Raglan argues that houses and temples share the same purpose of being the dwelling place; *'...houses were originally neither shelters nor dwellings but the temples, that is to say buildings erected for ritual purposes.'* He continues the argument by considering the way those buildings were designed and influenced by each other, not only locally but also globally; *'...the custom of building houses did not arise independently in different parts of the world, but spread as part of a religious complex, or series of religious complexes, originating somewhere in the Ancient East.'* (Raglan, 1964:ix) (Figure 4.8).

Traditional Thai houses and temples have similar architectural features (Figures 4.9-4.10) since the traditional craftsmen built houses in respect of temples' appearances (Pirom, 1979). In this way, harmony was achieved in the built environment where features like slender-roof lines, long and tapered openings and self-contained living units characterise both houses and temples. People lived their lives very close to Buddhism; that is every day in their houses and every religious day in their temples. Therefore, spatial orientation and awareness are basically formed by house and temple architecture. Considering the architectural space of houses and temples, the two most fundamental paradigms of activities that shape people's concept of social space then must be the domestic and religious ones (Figures 4.11-4.12).

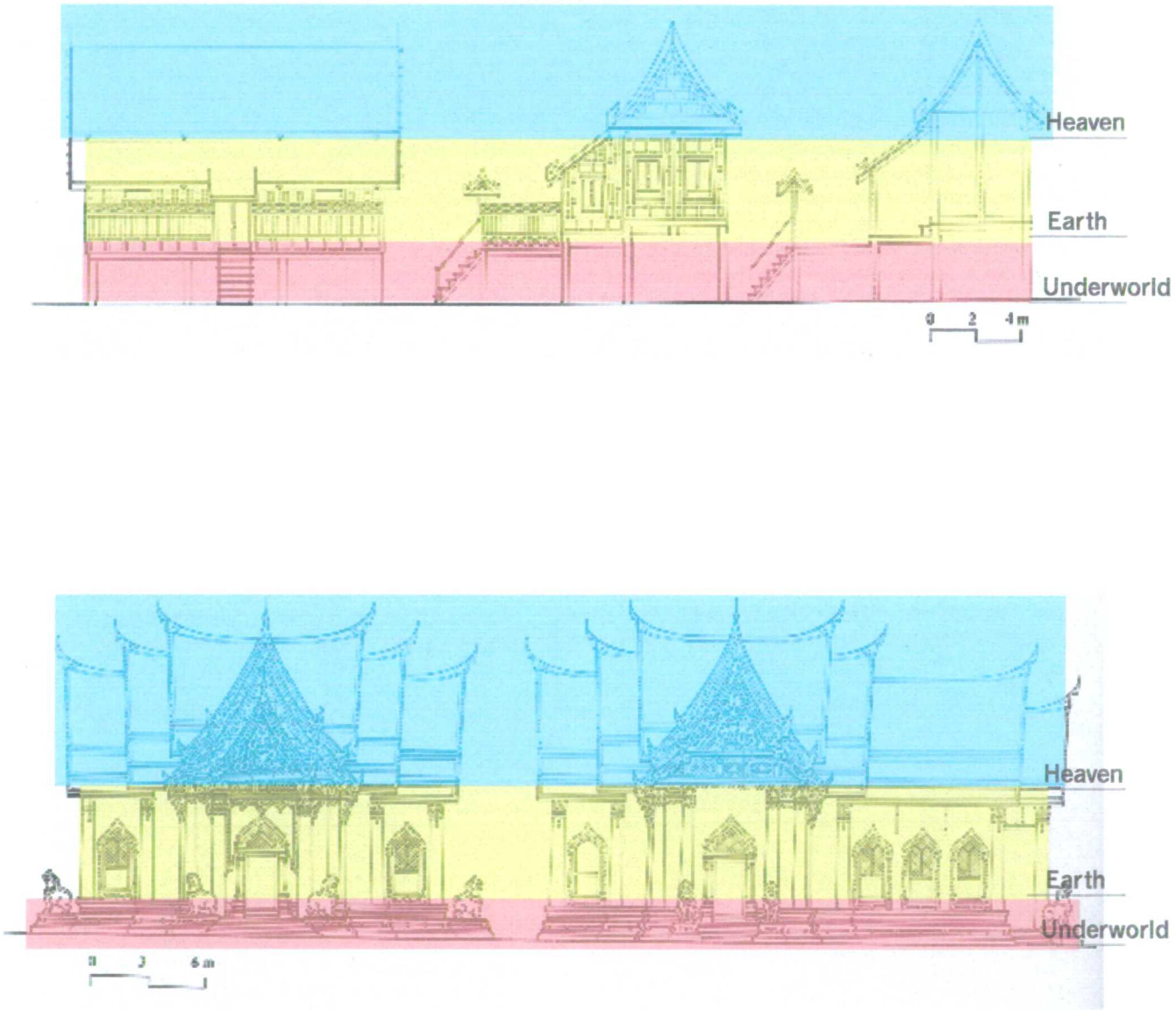


Figure 4.7 Three world concept in house and temple (Aasen, 1998)

Figure 4.8 Stave church, Borgund, Norway

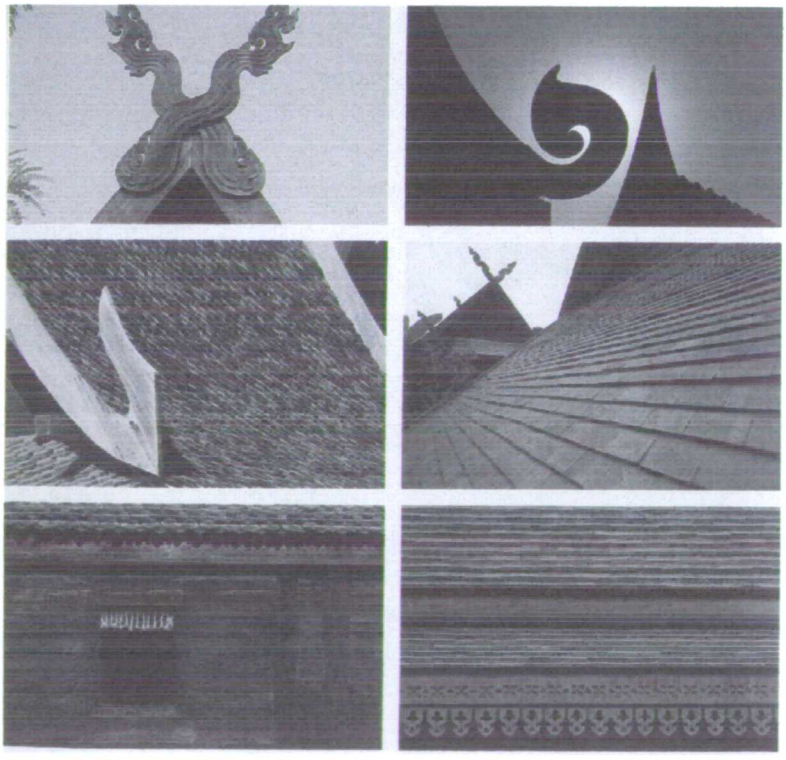
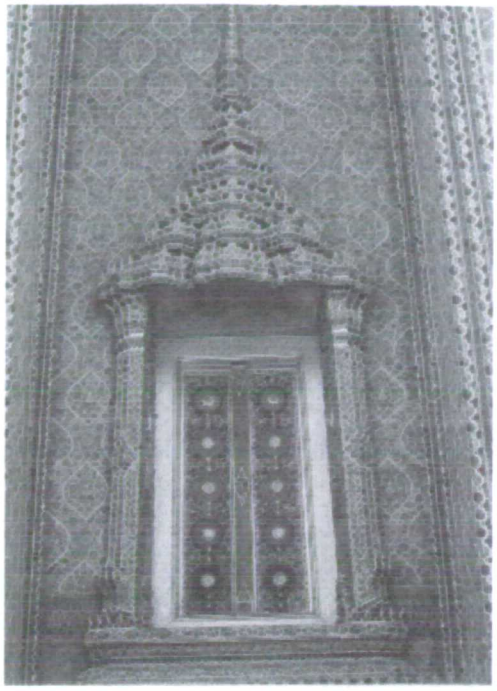


Figure 4.9 Details of Thai houses (Warren, 1989)



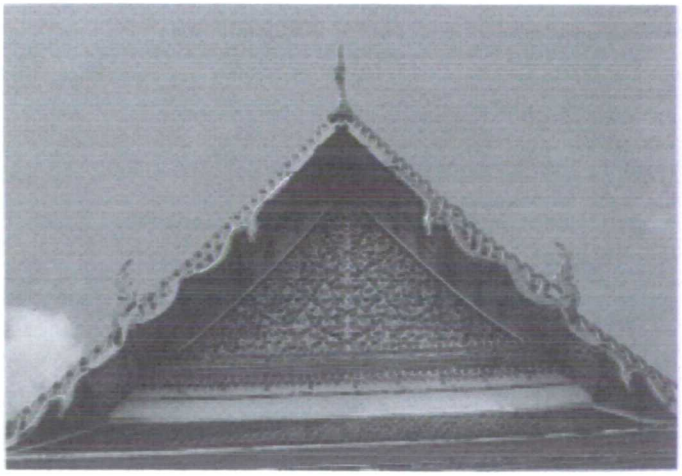


Figure 4.10 Details of Thai temples

Figure 4.11 Domestic activities (Jaijongruk, 1975)

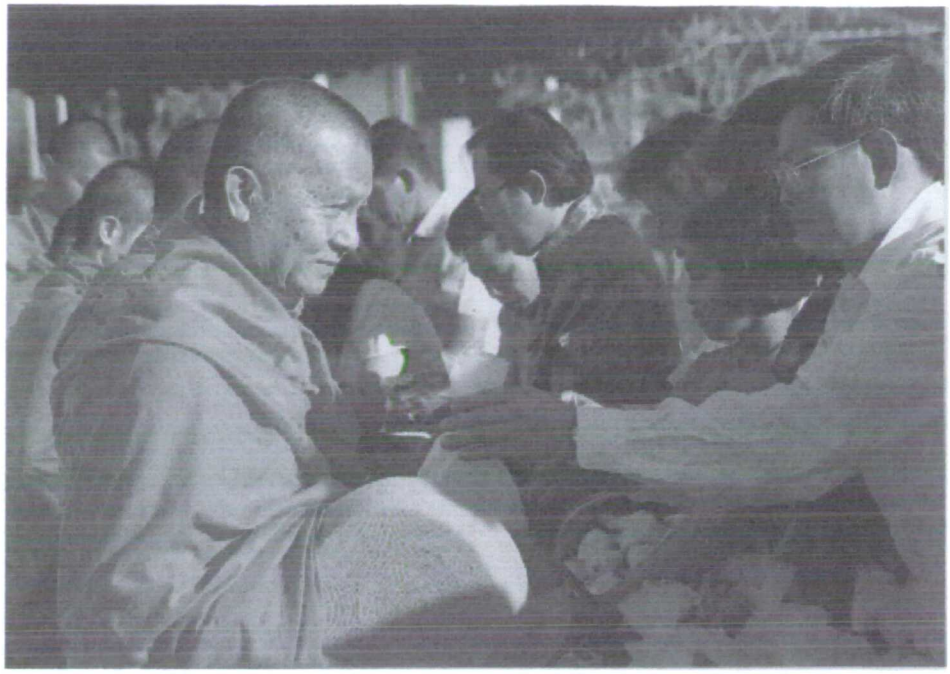


Figure 4.12 Religious activities

4.2 **Domestic life inside architectural space**: the traditional Thai house

In present-day Thailand, the term 'traditional' is linked to a specific way of life, world view, food, music, performance, apparel, crafts, instruments, architecture, suburban life and, in a more subtle way, Buddhism. Today, 'traditional' is known more in terms of style, 'a traditional Thai house' is associated with specific characteristics: high, pitched roof, prefabricated system of construction, the living compound on an elevated terrace and all wooden-craftsmanship. The term is also associated with the 'high and decent' way of life representing the peacefulness, simplicity and warmth of the extended Thai family. Some might conceive the term as an indicator of high status or as a privilege. In fact, the traditional life style is very much remembered together with the traditional Thai houses.

Thai society is characterised by a combination of two main influences: Buddhism and Kingship. Buddhism plays the major role in the individuals' way of life and world view, while Kingship influences society as a whole. Over 70% of the population are Buddhist. Buddhist monks also live in traditional Thai houses which have the impressions of pureness and the decent way of life. People's and monks' houses observe the same orientation and size with a few exceptions on the bay size and number of rooms (Jaijongruk, 1975; Pirom, 1979).

The term 'traditional' refers to the design of houses in the late Ayuthaya to the early Rattanakosin period which was the dominant way of building a house until the reign of Rama V (1868-1910) and VI (1910-1925) before western-house architecture was adopted. However, there has always been resistance towards westernisation. For example, some of the selected examples (Houses 1 and 2) were intentionally designed and built to be authentic models of traditional Thai architecture as part of the nationalist movement during 1910-32 (Aasen, 1998). Two of the six examples (Houses 4 and 5) are designed for contemporary lifestyle however their living units are more than a hundred years old and were put together into a new compound only a few decades ago.

A traditional Thai family usually comprises at least three generations, if not more, sharing one living compound reflecting the family structure and the social value of living together for working purposes, e.g. in the rice field. The house reflects this character in its openness, its lightweight construction and decoration and the dynamic relations of

forms (Jaijongruk, 1975; Kalayanamitr, 1982) which offer total permeability and visibility in the architecture (Figure 4.13). There is no strong characteristic of private, semi-public or public in Thai houses once one is on the elevated terrace. Different areas are marked by using steps and movable partitions. For example, the whole house becomes totally open once the doors of the living units are open. Even though there are steps to define different areas; accessibility and visibility are completely connected (Young, 1900). The boundary between the house and the general public is made clear by having the whole house lifted up to head-height and connected to the ground with removable stairs. In most cases, only two stairs, the main and service, are incorporated into a house compound. Small houses usually have one stairs while there could be more than two stairs in the houses of large extended families.

Thai houses do not have rigid spatial segmentation. The relationship between segmentation and social structure can be traced in the house more in its mentality than in its physicality which is turned into abstraction, into customs and codes of behaviour. Once the doors of living units are open, the whole complex becomes a completely open space. Thai architecture can be seen as having very loose spatial configuration where the autonomy of movement and activities is emphasised. Other criteria such as social role and responsibility and the system of gratitude, class, seniority and gender have their influences over the formation of people's behaviour (Suvanajata, 1973) and thus the way they build and move in architecture.

Thai houses have multi-purpose areas of veranda attached to each living unit which in plans seem to be uninterrupted space but they are both virtually segmented and gender-specific in reality. For example, the terrace or *Chan* is often for men to sleep on while women will always sleep inside the rooms or in the daytime women will often sit on verandas in front of living units while men are out in open space. At the main entrance, one usually has the most powerful permeability and visibility of the whole house. Another important part of a Thai house is *Chan* serving many activities with passage, junction or place in its different areas. With 40% of the whole house space (Soonthornsamai, 1989), *Chan* has the highest control over the house expansion when more living units are added to the house.

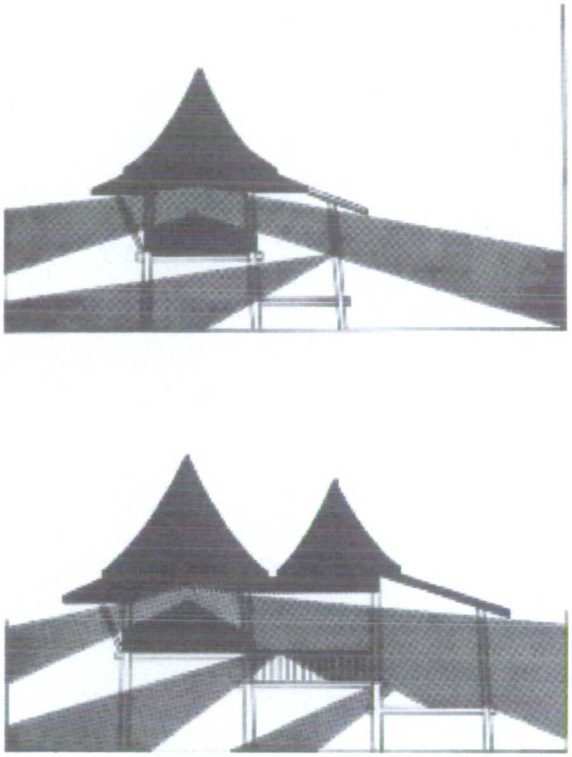


Figure 4.13 Continuity of space in Thai house (Jaijongruk, 1975)

Living units in Thai houses are detached rooms which are fully equipped with their own dressing rooms and toilets in big and el borate compounds. They usually have two by three-bay proportions and are placed some distance apart from one another for privacy. There are specific names for different units according to their locations and functions. For example, *hawklang* (the centre room) is usually the first living unit constructed for the parents which will be taken as the reference element during the expansion of the house. Other living units in the Thai house are named according to their orientations in respect of this centre unit. *Hawkwang* is the living unit that is placed perpendicular to the centre unit. *Hawree* is the unit that is placed parallel to the centre unit. *Kwang* and *ree* mean 'obstruct' and 'lean toward', respectively. *Hawkwang* is not usually used for sleeping because its orientation is parallel to the course of the sun during the day. This living unit normally has one of its longer sides open to the *chan* of the house. The unit is used to receive guests and meeting place of the family (Figure 4.14).

As in temples, the terms 'conventional' and 'contemporary' used to categorise these houses are based on the time when the houses were built, intention of the architects and also on the activities of the inhabitants. However, all the selected houses have the basic characteristics of a traditional Thai house of central Thailand. Houses 1, 2 and 3 are conventional examples while houses 4, 5 and 6 are contemporary examples. The analysis and observation are focused on the main activity area that is on the raised platform level in the conventional examples and on both ground and first floors levels in the contemporary examples. The activities in these selected houses are fully-developed form in which etiquette and well-defined customs are already mature. All of the selected 'Traditional Thai houses' are very well known and are considered to be the 'masterpieces' of their kinds offering the most effective and at the same time the most intelligible way of how spaces of their kinds can be put together.

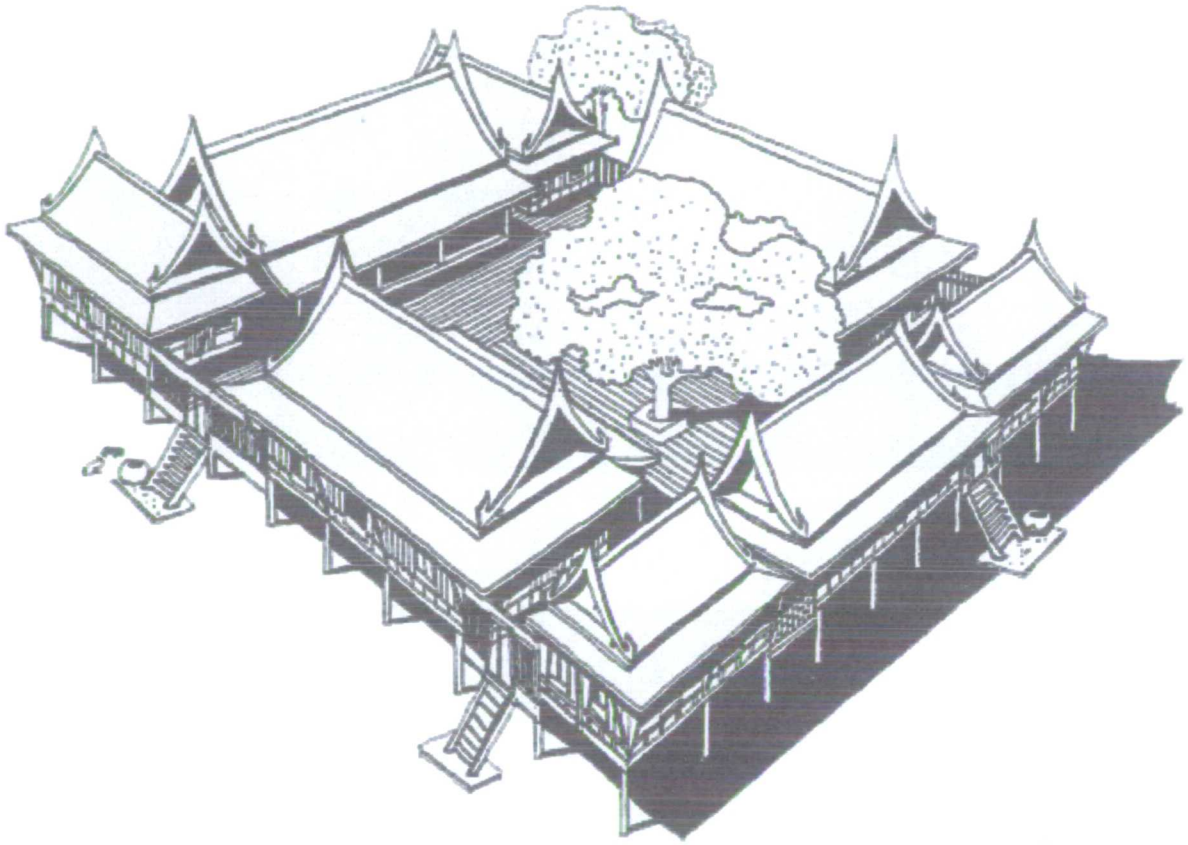


Figure 4.14 A classical Thai house (Jaijong ruk, 1975)

Conventional houses

House 1: Ruen Ton (The Common house), Bangkok (Figure 4.15)

-History: The house was built in the reign of King Rama V (1868-1910) based on the central Thai style for medium size family. King Rama V lived in the house with some of his relatives as it was designed to serve the common lifestyle of Thai people. The King also received guests and sometimes held informal meetings with government officers in this house. The house is widely studied and used as the reference for design and analysis of Thai houses.

-Size and location (plan from the Fine Art Department, 1975):

Conventional house: **House 1**: measurement		
element	number	size (metre)
Sleeping unit	2	9.00 x 5.25 (with verandas)
Hall	1	7.50 x 4.75
Room	1	5.40 x 4.50
Pavilion	1	5.00 x 2.15
Kitchen	1	5.40 x 4.25
Bathroom	2	3.50 x 2.00 and 2.70 x 2.00
Total area of study = 25.40 x 14.75 (main terrace) + 5.40 x 2.25 (small terrace)		

Table 4.1: Measurement of house 1

The house is located in the compound of Dusit Palace in the historical area of Bangkok. There is also a replica that is open to the public at Muangboran (Ancient City) in Samutprakarn province to the south of Bangkok.

-Architectural elements and functions:

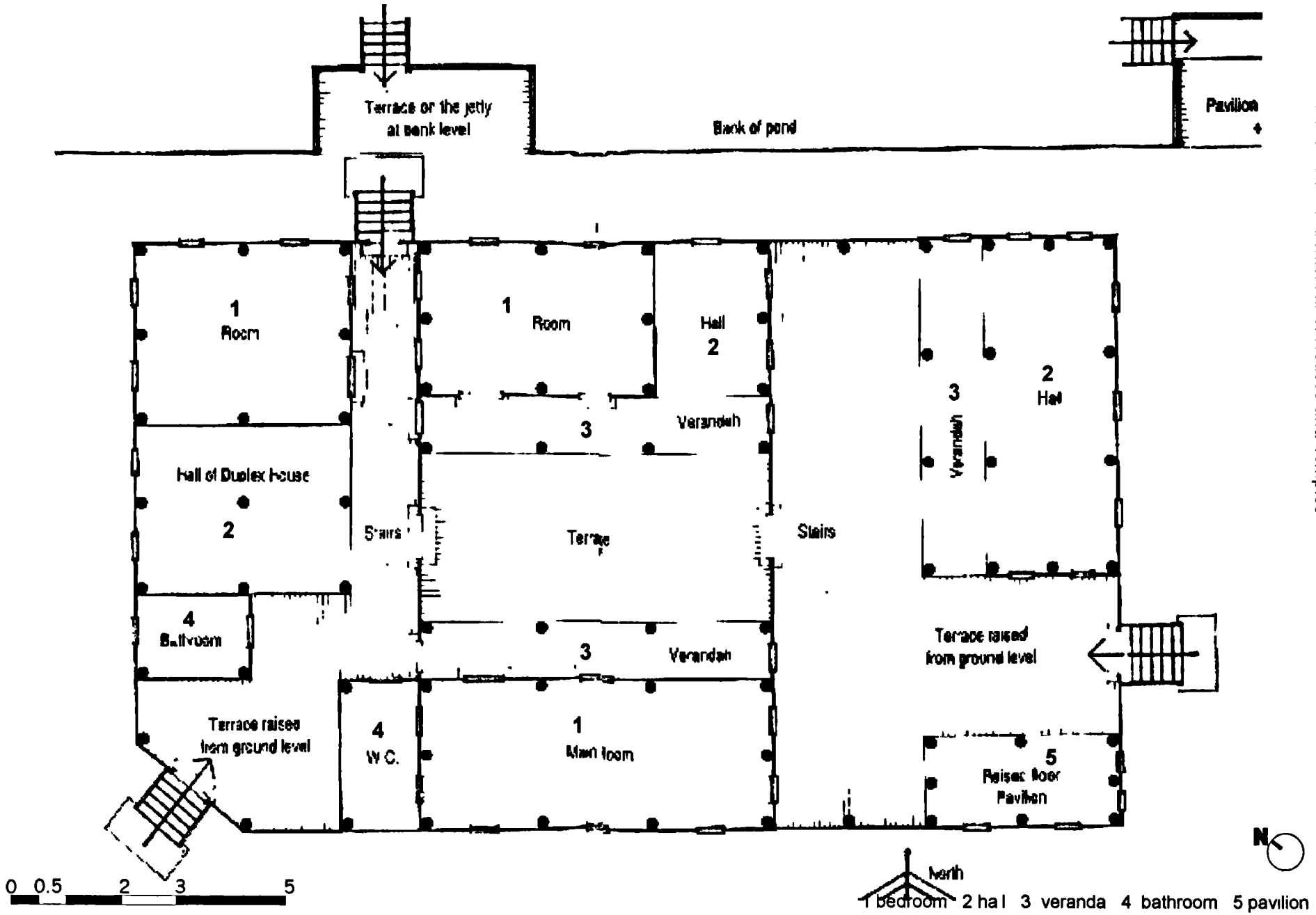
Sleeping unit: two units areequipped with verandas and a hall. These two units face the inner terrace which can be sealed off from the rest of the complex.

Hall: an open unit used for receiving guests. It is next to the main entrance.

Room: a servant bedroom. It is located next to the kitchen and the service entrance at the north side which leads to the small terrace used as a boat port.

Pavilion: a small unit used for relaxing and receiving guests.

-Occupants: It is now occasionally used by some members of the royal family.



Ruen Ton, Bangkok: House 1

Figure4.15 Plan of House 1

House 2: Ruen Tabkwan, Nakorn Pathom (Figure 4.16)

-History: The house was built as a part of Rama VI's (1910-1925) Sanam Chan palace in Nakorn Pathom. It was designed and built by the architect Phraya Wisawakam Prasit earlier this century. After the reign of Rama VI, the house was neglected and had been in poor condition until recently when it was renovated to its original state. The house is known to be one of the most beautiful and complete versions of a traditional Thai house and has been highly regarded as one of the masterpieces of the traditional Thai house.

-Size and location (plan from the Fine Arts Department, 1975):

Conventional house: **House 2**: measurement		
element	number	size (metre)
Sleeping unit	2	9.00 x 6.45 (with verandas)
Hall	1	9.00 x 7.15
Pavilion	2	5.40 x 3.00
Kitchen	1	4.15 x 3.00
Bathroom	2	4.15 x 3.00
Servant unit	1	7.50 x 4.75
Total area of study = 29.90 x 20.50		

Table 4.2: Measurement of house 2

The house is a part of Sanam Chan palace in Nakorn Pathom province to the west of Bangkok. There is also a replica that is open to the public at Muangboran (Ancient City) in Samutprakarn province to the south of Bangkok.

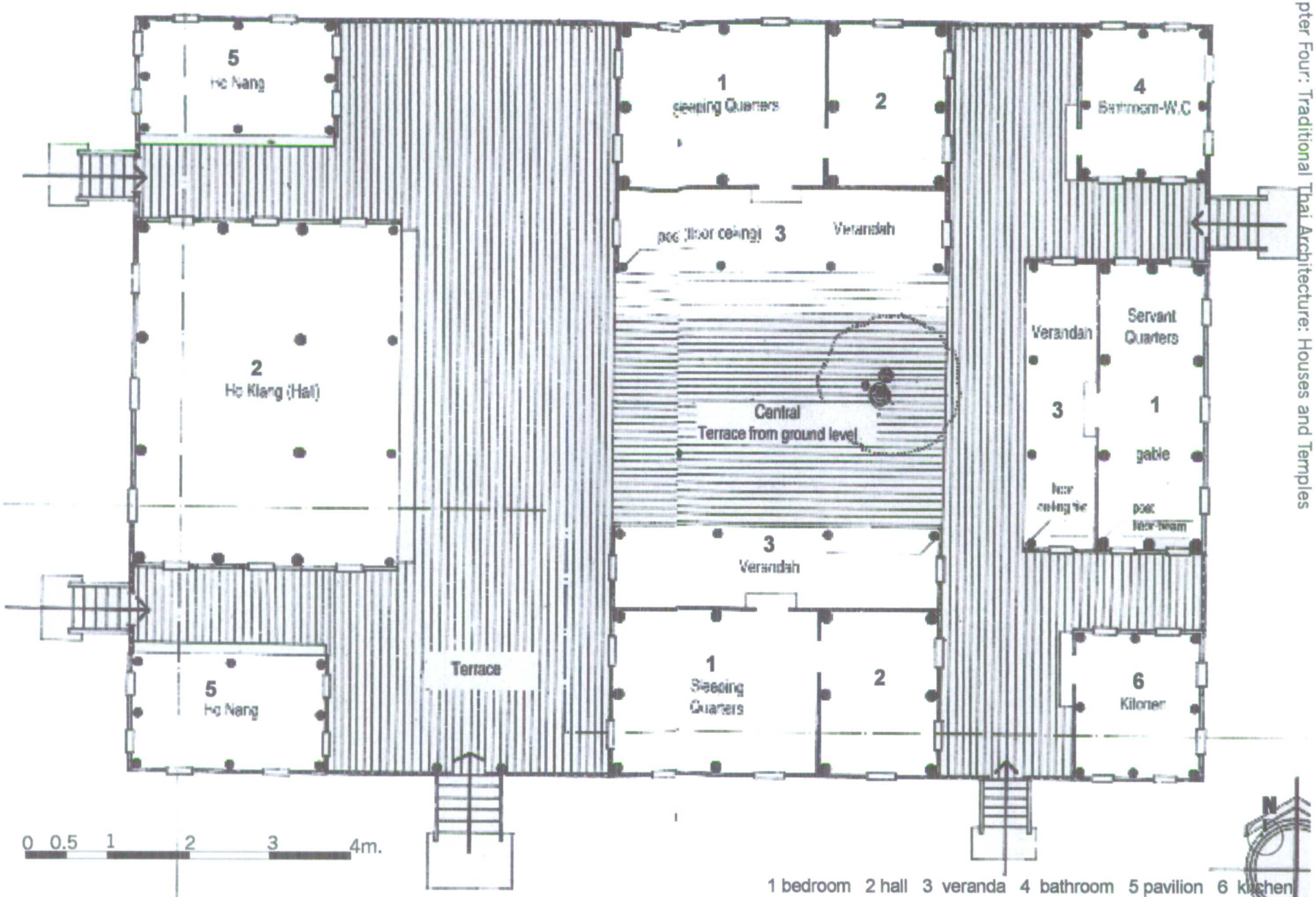
-Architectural elements and functions:

Sleeping unit: two units facing each other at the central terrace and one servant unit is next to the service entrance to the east.

Hall: an open unit used for receiving guests. It is next to the two main entrances.

Pavilion: two small units used for relaxing and receiving guests.

-Occupants: Currently, the house is not permanently occupied and is being looked after by the Fine Art Department and Silpakorn University.



Ruen Tabkwan, Nakorn pathom: House 2

Figure 4.16 Plan of House 2

House 3: monks' house at Wat Yai Suwanaram, Petchaburee (Figure 4.17)

-History: These 10 living units for monks at Wat Yai Suwanaram were renovated in the early twentieth century however the original complex was built more than two hundred years ago. The architect who composed the compound intentionally put six different styles of panels on different living units together to illustrate the rich varieties of the central Thai design. It was built in the highly acclaimed Ayuthaya style and is listed as one of the most valuable pieces of traditional Thai architecture.

-Size and location (survey, 1998):

Conventional house: **House 3**: measurement		
element	number	size metre)
Sleeping unit	10	(8 three bay-units) 9.00 x 7 50 and (2 five bay units) 15 x 7.50 (all with verandas)
Prayer hall	1	15.00 x 7.50
Library	1	9.00 x 4.50
Dining hall	1	9.00 x 4.50
Bathroom	2	5.50 x 2.75
Total area of study = 62.00 x 30.00 (main terrace) + 16.50 x 9.50 (library area)		

Table 4.3: Measurement of house 3

The compound is located to the south side of the temple at Wat Yai Suwanaram (Temple 3) in Petchaburee province, Southwest of Bangkok.

-Architectural elements and functions:

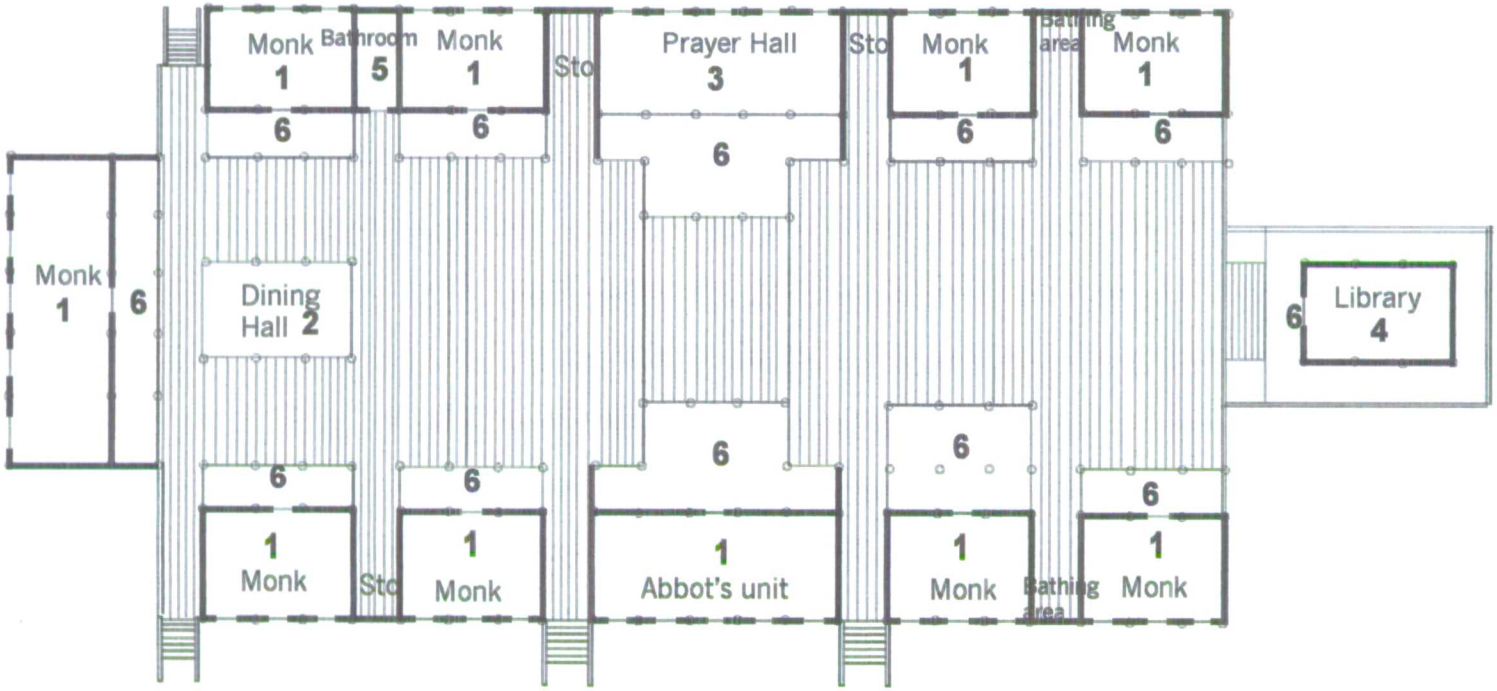
Sleeping unit: two five-bay units for monks and the abbot and eight three-bay sleeping units for monks, all units have a veranda for receiving guests.

Prayer hall: a five-bay unit for religious activities and assembly of all the monks.

Library: or *hawtri* for depositing Buddhist manuscript, books and Buddha images.

Dining hall: an open pavilion where all monks in the compound prepare and have meals. It is used twice a day, early in the morning and at 11 a.m.

-Occupants: The compound with its 10 living units can house 11 monks or more in the ordination season. Visitors and tourists regularly visit the house.



N

0 1 2 3 5

1 bedroom 2 dining hall 3 prayer hall 4 library 5 bathroom 6 veranda

Monk residence, Petchaburee: House 3

Figure 4.17 Plan of House 3

Contemporary houses

House 4: Ratakasikorn residence, Bangkok (Figure 4.18)

-History: This 30-year-old house was designed by its owner who is one of the best known architects and teachers combining the modern way of living with the essence of traditional (Sangaroon, 1979). Three hundred-year old living units were brought from different places and organised to accommodate a family of three.

-Size and location (survey, 1998):

Contemporary house: **House 4**: measurement		
element	number	size (metre)
Lower floor		
Living room	1	8.00 x 6.00
Bedroom (owner)	1	5.50 x 5.50 (with a bathroom)
Servant bedroom	2	2.80 x 2.80
Servant bathroom	1	3.00 x 2.50
Kitchen and Dining room	1	11.50 x 4.30
Pantry	1	2.70 x 2.50
Upper floor		
Sleeping unit	3	(North 8.50 x 5.00, (West) 9.00 x 6.00 and (East) 9.00 x 5.50
Bathroom	1	2.50 x 2.50
Storage	1	2.50 x 2.20
Total area of study = 2 [20.00 x 19.00] + 9.00 x 5.50 (East-sided living unit)		

Table 4.4: Measurement of house 4

The house is at no. 12, Soi Praphunsak, Nanglinjee Road, Bangkok.

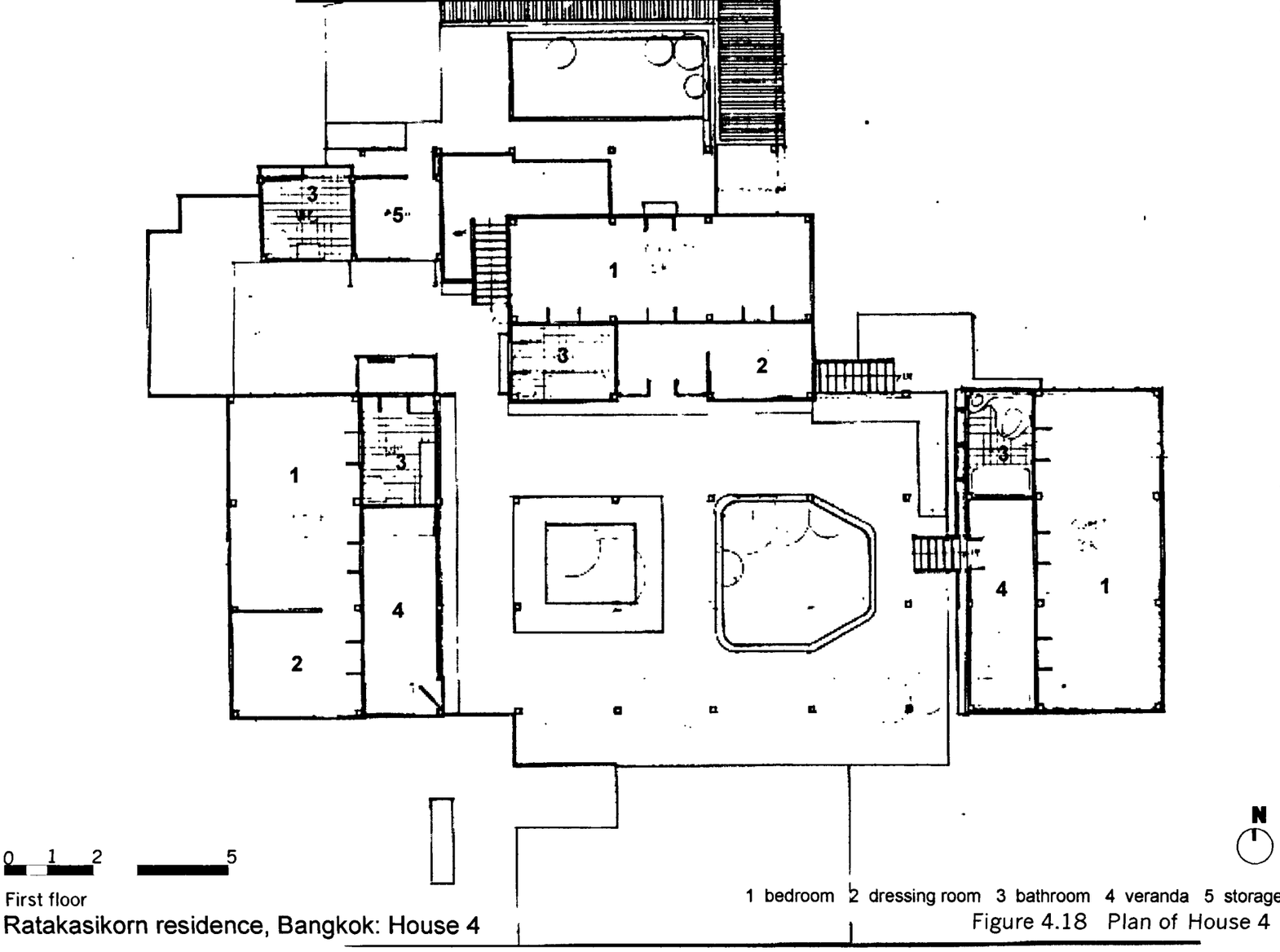
-Architectural elements and functions:

Sleeping unit: the north-sided unit belongs to the daughter and granddaughter of the owner. Mrs. Ratakasikorn stays in the west-sided unit while guests will be accommodated at the east-sided unit. Each is equipped with a bathroom, a dressing room and a foyer.

Living room: the room is used mainly to receive guests while the inhabitants relax in the roomy kitchen/dining room at the back of the house.

Bedroom: bedroom on the lower floor is used by the owner and her granddaughter.

-Occupants: There are five people who currently use this house: Mrs Ratakasikorn who is an architect, her daughter who is a librarian, her granddaughter and two female servants.

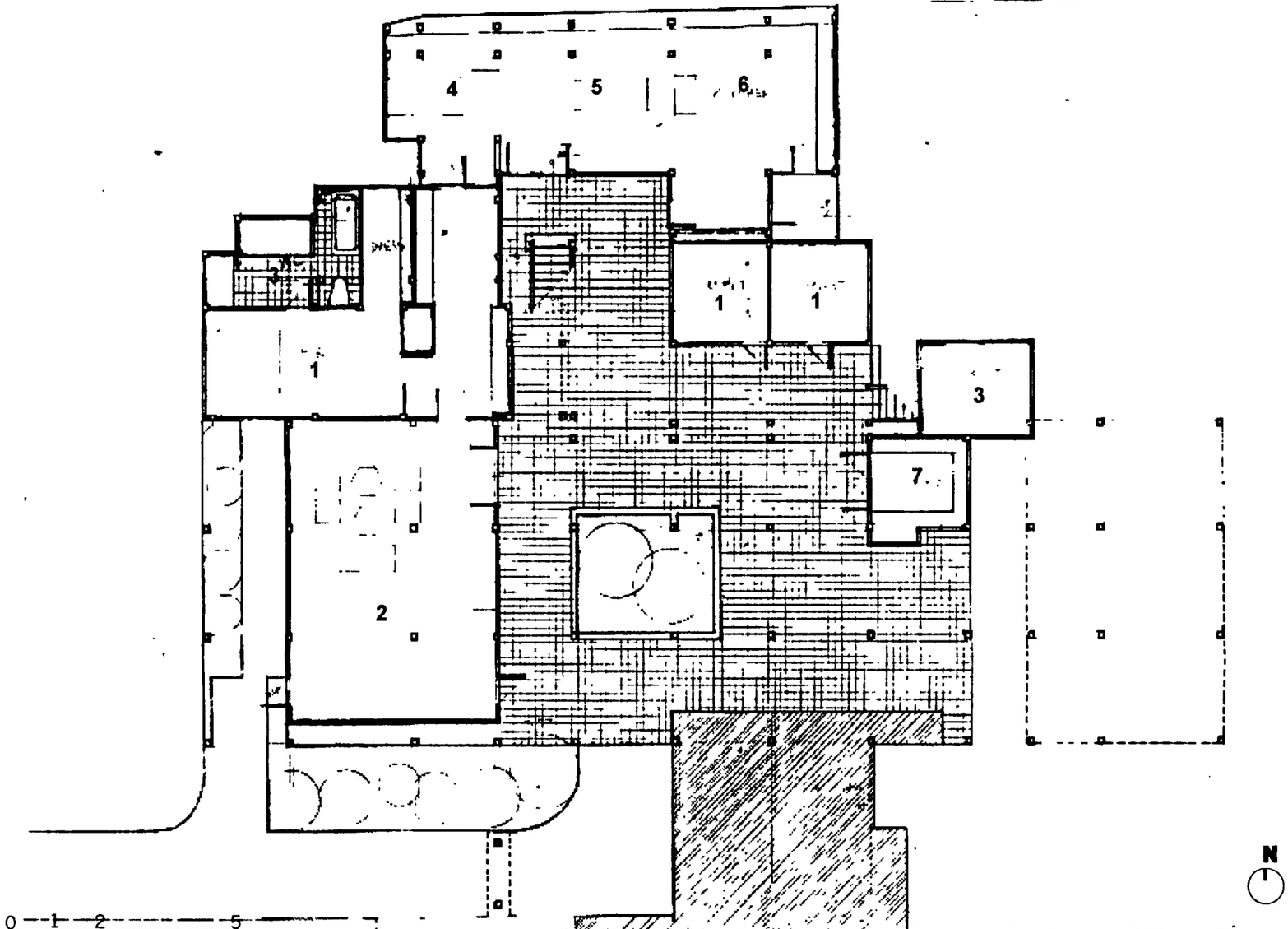


First floor

1 bedroom 2 dressing room 3 bathroom 4 veranda 5 storage

Ratakasikorn residence, Bangkok: House 4

Figure 4.18 Plan of House 4



1 bedroom 2 living room 3 bathroom 4 living area 5 dining area 6 kitchen 7 pantry

Ratakasikorn residence, Bangkok: House 4

Figure 4.18 Plan of House 4/Ground floor

House 5: Bunnag residence, Bangkok (Figure 4.19)

-History: Completed in 1965, the house originally belonged to a family of four: Mr. and Mrs. Bunnag and their two sons. The planning of the house is the collaboration between Mr. Bunnag and another well-known architect. The living units were transported from different provinces in central Thailand on a barge along Chaopraya River. The house has gone through some adaptations mostly in its service sector while the original configuration on the upper level remains intact.

-Size and location (survey, 1998):

Contemporary house: **House 5**: measurement		
element	number	size (metre)
Lower floor		
Living and Dining area	1	10.50 x 8.50 (open courtyard)
Reading room	1	5.50 x 3.40
Pantry	1	3.00 x 2.60
Servant bedroom	2	8.50 x 3 00 (with a bathroom) and 6.00 x 3.40
Kitchen	1	5.60 x 4.00
Bathroom	3	(1) 3.00 x 2.60 and (2) 3.20 x 1.30
Upper floor		
Sleeping unit	2	(1) 8.55 x 5.86 and (1) 8.55 x 6.15
Living unit	1	8.48 x 3.31 (with a veranda)
Spirit room	1	2.85 x 2.65
Study unit	1	5.30 x 3.00
Pavilion	1	2.90 x 2.00
Servant unit	1	6.15 x 5.40 (with a veranda)
Total area of study = 694 square metres		

Table 4.5: Measurement of house 5

The house is at no. 1, Sukhumvit 81, Sukhumvit Road, Bangkok.

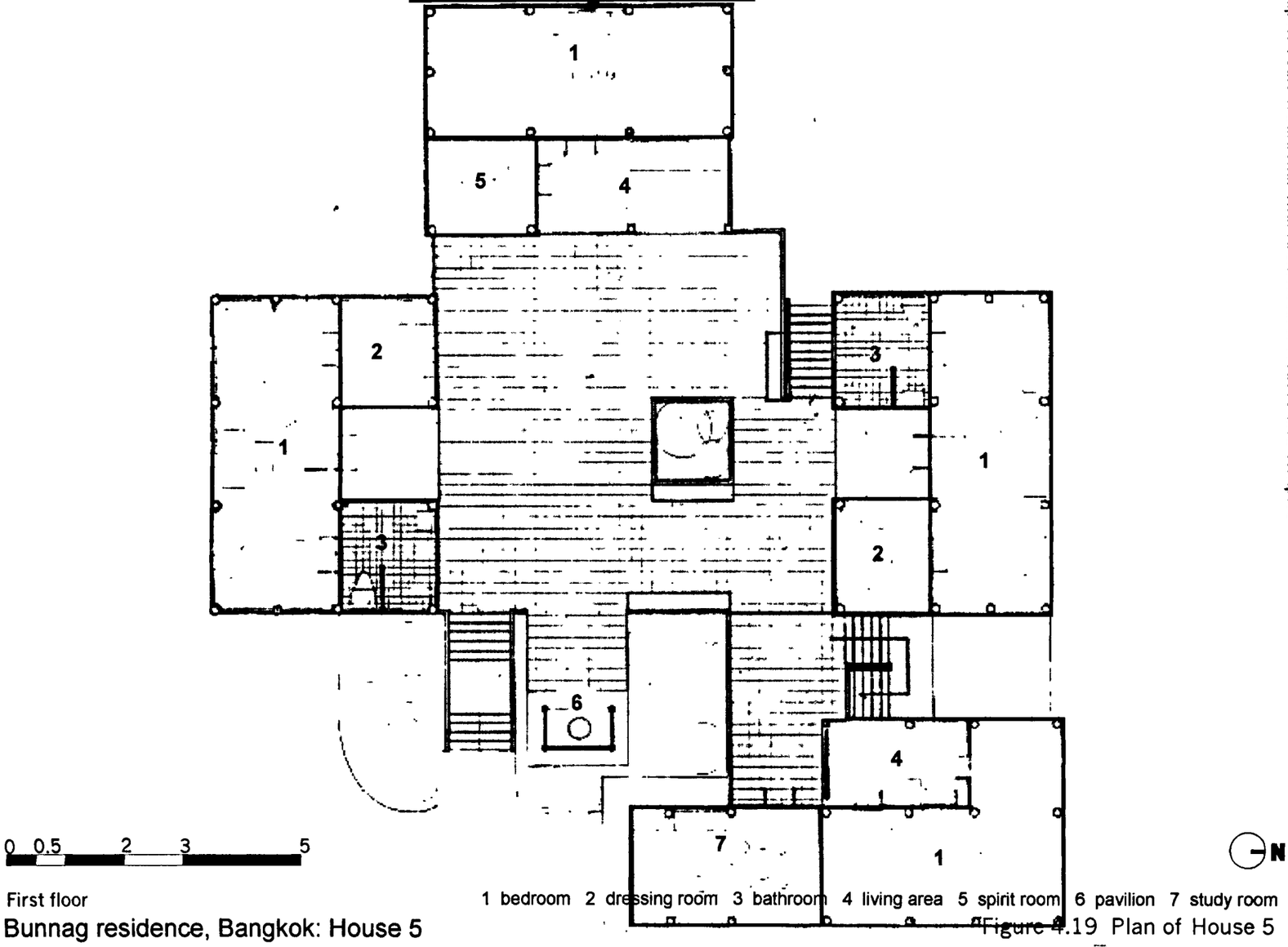
-Architectural elements and functions:

Sleeping unit: the north-sided unit is the master bedroom while the south-sided unit is the guest unit, each with a bathroom, a dressing room and a foyer.

Living unit: used as a living room and for receiving guests

Spirit room: houses Buddha images

-Occupants: The house now accommodates 13 people: Mrs. Bunnag, two families of servants, a cook, a driver and a gardener. Guest stay at separate compound.

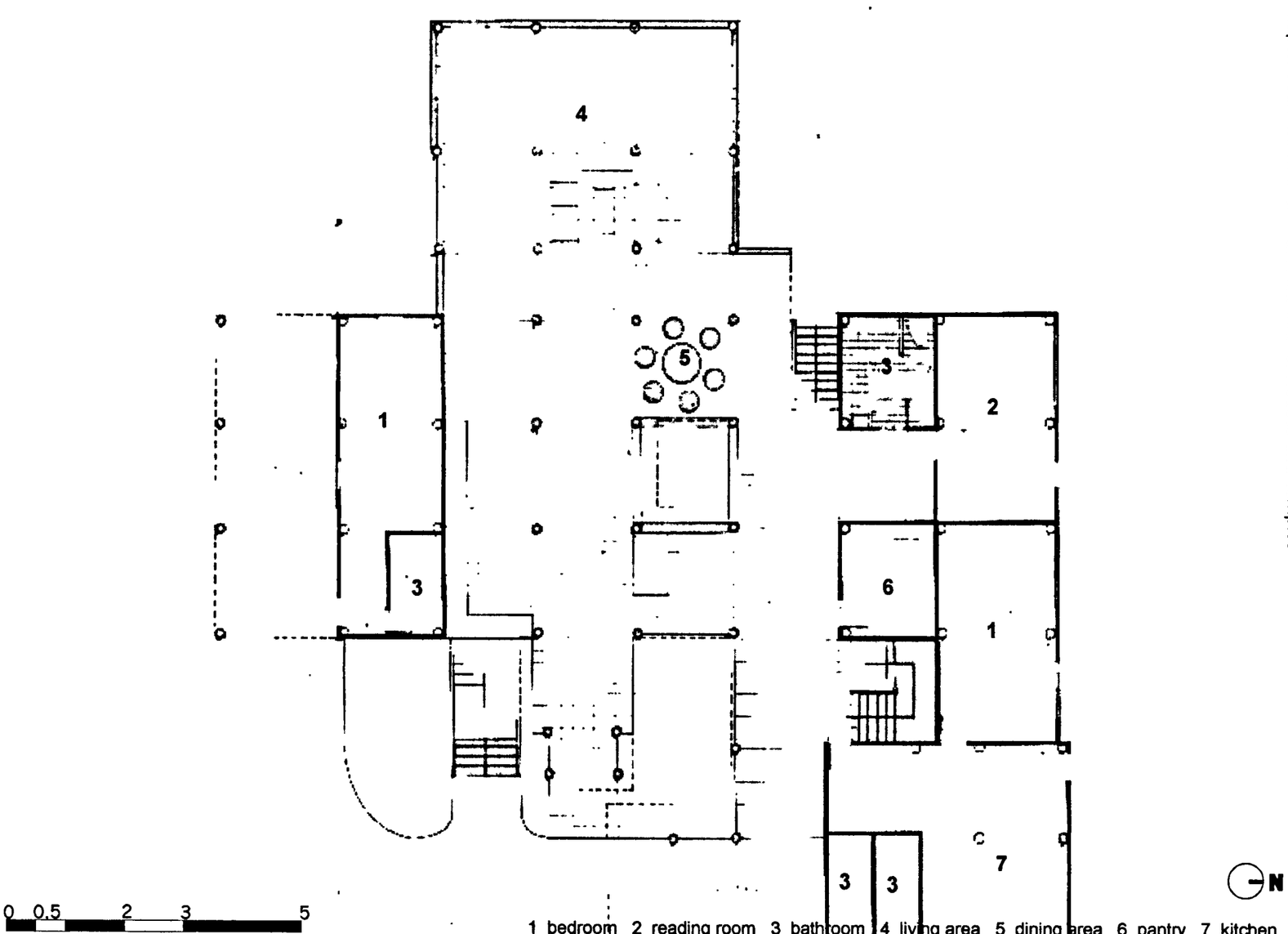


First floor

1 bedroom 2 dressing room 3 bathroom 4 living area 5 spirit room 6 pavilion 7 study room

Bunnag residence, Bangkok: House 5

Figure 4.19 Plan of House 5



1 bedroom 2 reading room 3 bathroom 4 living area 5 dining area 6 pantry 7 kitchen

Bunnag residence, Bangkok: House 5

Figure 4.19 Plan of House 5/Ground floor

House 6: monks house at Wat Suthus, Bangkok (Figure 4.20)

-History: The original monk quarter was built in 1847. This kind of monk house is common in Bangkok because of the limited space. The big open terrace was compressed into a small platform and passages. It is a typical example of its kind and is one of the places that have been renovated very recently.

-Size and location (plan from the temple):

Contemporary house: **House 6**: measurement		
element	number	size (metre)
Lower floor		
Dayroom	2	3.20 x 3.20
Bathroom	8	3.00 x 1.60
Storage	4	3.00 x 2.40
Upper floor		
Sleeping unit	7	(6) 4.00 x 2.40 and (1) 5.60 x 5.20
Dining hall	1	5.60 x 3.20
Storage	6	(2) 1.60 x 1.60 and (4) 3.00 x 1.00
Total area of study = 298.80 square metres		

Table 4.6: Measurement of house 6

The house is located within the monastery area of Wat Suthus (Temple 2) within a close distance from the *ubosot.*

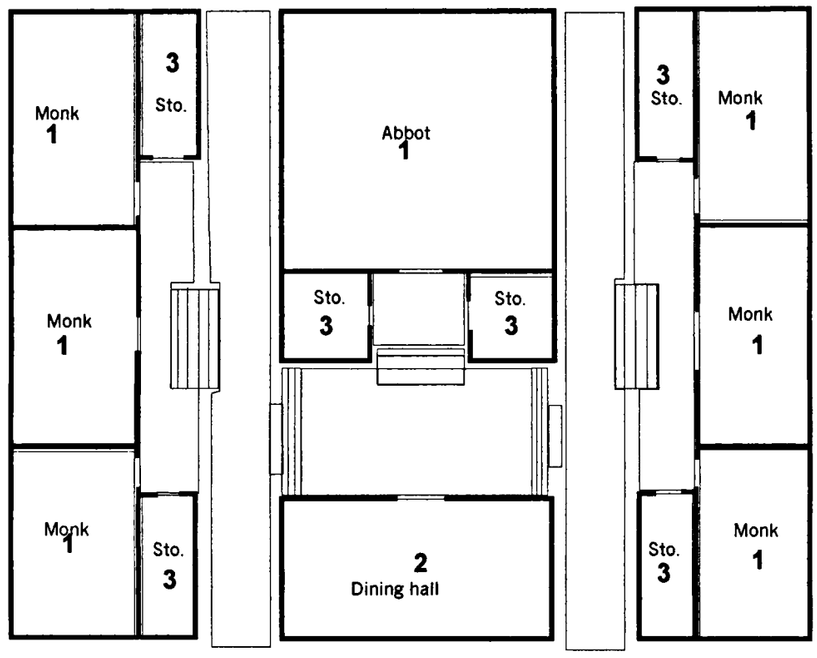
-Architectural elements and functions:

Sleeping unit: the abbot-sleeping unit is the largest and centrally located near the central platform and dining hall. In the room there is an altar for daily religious activities. This room functions like the prayer hall at house three but is much smaller. The monk-sleeping units are about the size of a one-bay space of a Thai house.

Dining hall: the room functions the same as the dining hall at house 3 where all the monks have meals together. It is sometimes used as a meeting room of the abbot

Dayroom: a multi-purposed room where food is prepared or guests are received.

-Occupants: A compound like this one can accommodate up to 13-15 monks. During the day, many people visit the monks and wait in the dining hall and dayroom or on the verandas in front of the sleeping units.



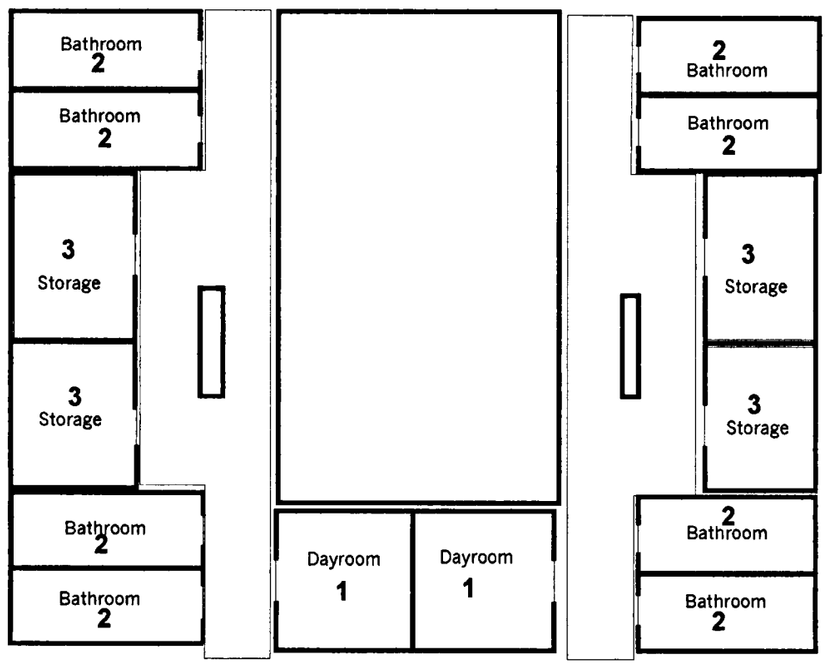
0 1 3 5

First floor

Monk residence, Bangkok: House 6

1 bedroom 2 dining hall 3 storage

Figure 4.20 Plan of House 6/First floor



0 1 3 5

Ground floor

Monk residence, Bangkok: House 6

1 dayroom 2 bathroom 3 storage

Figure 4.20 Plan of House 6/Ground floor

These six houses will be analysed in the next chapter using the analytical methodologies outlined in chapter three and information from on-site observations. The houses' spaces are broken down into 340 convex spaces altogether. The analysis will consider the theoretical and historical background together with socio-cultural aspects that are exclusive to Thai houses as well as house and architecture in general.

4.3 Religious life inside architectural space: The traditional Thai Buddhist temples

Space inside temples seems to have strong characteristics where one has a different life, the religious life, apart from the domestic life in one's house. Together with houses, temples represent the oldest institution on which people base their first and most enduring impressions about space and architecture. The idea that houses and temples are created in a similar way based on the concept of dwelling is widely discussed and believed to be the case for many cultures (Raglan, 1964). Pirom argued that the architecture of Thai Buddhist temples was created based on the basic geometry of Thai houses which is, for example, the elasticity of forms that is the characteristic of wood and the lightness achieved by reducing the scale of the roof etc. These characteristics are glorified in the temples' elements and were later used by craftsmen to build houses in respect of the temples' appearance (1972). Harmony was achieved in the environment because of the intention to build houses and temples as one unified unit.

Thai Buddhist temples have received a lot of influence from mythical beliefs in the Gods and the idea of the temple being the centre of the universe from Hinduism. The planning of the temple has been inspired by the concept of being the centre of the universe though not for higher God but for Buddha's philosophy. This idea has always been the centre of Buddhism in Thailand and thus leads to the concept of temples as meeting places to learn. Thus the main building, the *ubosot*, has the characteristic of being a hall of learning and meeting (Figure 4.21). People spend time in the temple listening to the summons, talking among themselves, praying, relaxing and meditating. There is always a large prayer hall in the *ubosot* for these purposes. The same space has to be big enough for the gathering of all monks of the monastery who will perform their routine religious activities there. According to conventional design, the *ubosot* has to be big enough for the assembly of at least 21 monks (Kalayanamitr, 1982).

Figure 4.21 Temple as a meeting and learning place

Thai social values intertwine with Buddha's philosophy so closely that people see the temple as a place where one could discover one's better self. The experience of the temple as the meeting place is also strengthened by the idea of the temple as a school for all, such as at Wat Prachetupon (Temple 1) (Figure 4.22). The temple is very much involved in everyday life. It is like a cultural centre where Buddhists need to be and be seen. In comparison to the idea of religious architecture as the place of God that generates the experience of junction between the divine and profane, the Thai Buddhist temple generates the experience of a place for people.

Religious architecture is more than a place for social activities; it also provides the setting for spiritual experience in activities (Davies, 1982). In this respect, temples need to have their spaces specially defined e.g. Wat Suthus (Temple 2), the location of the *wihan* is said to be at the centre of Bangkok (Figure 4.23). The location and spatial demarcation in Thai temples, especially in conventional ones, is strictly emphasised and enforced from the start and throughout the existence and use of the buildings. It is more relaxed in contemporary temples suggesting a meeting place of worshippers in a broader sense. The configuration of Thai religious architecture always has a strong sense of journey through many hierarchical layers reflecting the belief in one's journey to Nirvana or the journey to the top of the Meru mountain.

Nowadays, the contemporary religious architecture in Thailand has reduced the notion of the superimposition of layers but kept the sense of demarcation using mainly *Sema* or demarcation posts to differentiate sacred and profane areas (Figure 4.24). *Sema* posts, elevated platforms and stepped terraces are often used to deliver the sense of religious zones in contemporary designs rather than closed walls in conventional design. As a result, the architecture physically becomes more open and accessible to the mass public. Traditionally Thai Buddhism tends not to worship any god but to worship Buddha's philosophy. This idea includes the worship of good acts, among which, is the act of going to temple. Therefore, to go to temples or to associate with them in any way become honourable acts. Thus temples serve as meeting point for honourable people.

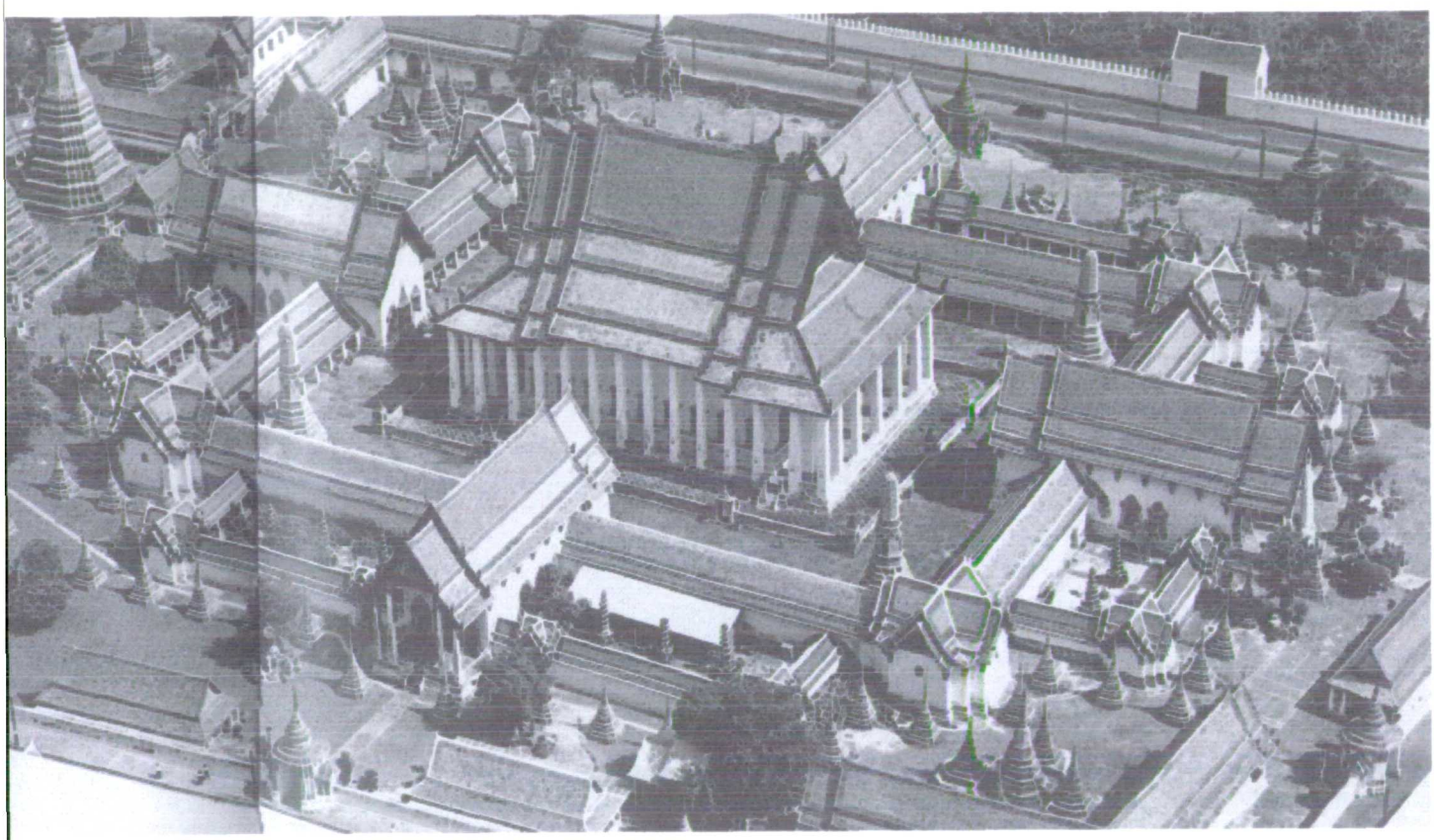


Figure 4.22 Wat Prachetupon (temple 1)

Figure 4.23 Wihan of temple 2

Figure 4.24 Demarcation post in temple 3

Wat Prachetupon (Temple 1) was designed to be the place where, in the old days, scholars met and studied while others assembled around its *ubosot* outside the cloister. The contemporary temples express this idea of meeting place even more clearly and widely. The Thamakaya school (Temples 4 and 6) (Figure 4.25) offers the notion of a community, or a special club, where the worshippers meet and take part or make decisions in its advancement and direction. In this case, the temple becomes more and more like an auditorium or a conference hall where the members meet and discuss their beliefs and community affairs in the presence of the teacher, the Buddha.

Thai temple space has evolved together with the activities and needs of the communities they serve; their spaces have been altered to accommodate new activities, as in temples 1, 2 and 3. New concepts have been employed to design temples based on the requirements of people in the city such as Wat Hualumpong (Temple 5) (Figure 4.26) or for people who seek new approaches to their religious activities such as at Wat Luangpo Sod and Wat Prathamakaya (Temples 4 and 6) (Figure 4.27-4.28). In short, the religious life in Thai Buddhist temples is active and innovative. The selected temples will be discussed as the model for the analysis in order to give the details of how they were conceived and united as a special type of architecture in Thailand.

Thai Buddhist temples have gone through many transformations and different styles have influenced the present versions of its architecture. The temples in central Thailand have established themselves as the main character of the Thai Buddhist temples that have been recognised by the Thai and people around the world. The study focuses on this type of temple and on particular examples that represent either the highest achievements or special characteristics, as the new temples become more and more independent in their philosophy. In the following section, basic architectural elements and their functions and different design theories from different periods are discussed in relation to the selected examples.

Figure 4.25 Closed wall design, temple 3 cloister

Figure 4.26 new temple design, temple 5

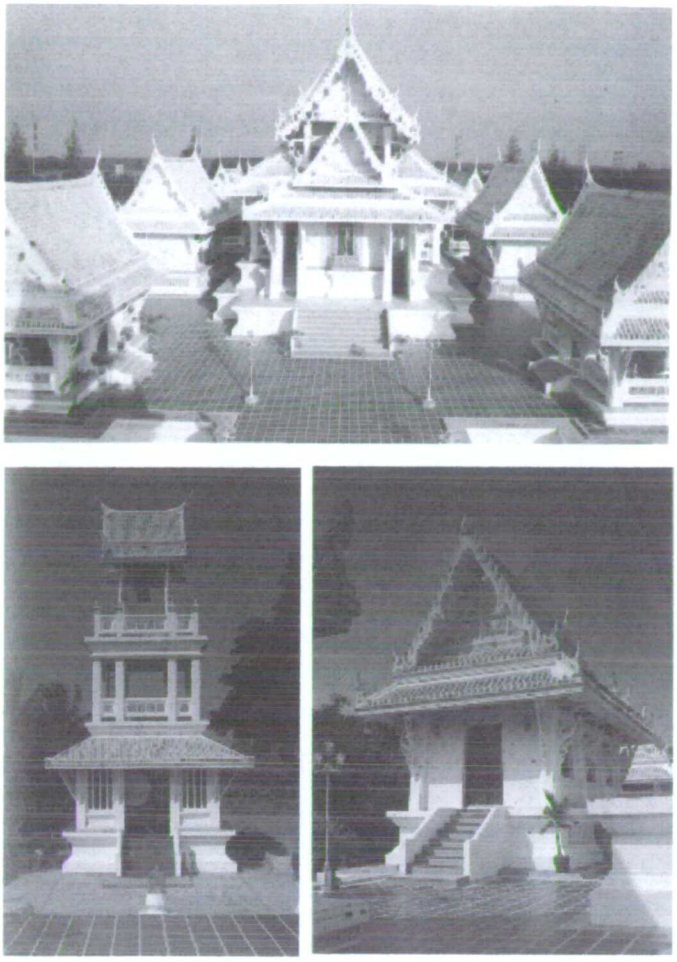


Figure 4.27 New temple design, temple 4

Figure 4.28 New temple design, temple 6

The origin of Thai Buddhist temples dates back to about 543 BC in India. The first thing that was built was the *chedi* as a place for preserving Buddha's remains such as a bone or personal items. From then on all the Buddhist temples have their symbolic centres at the *chedis*. Buddhism has been settled in Thailand since 549 BC when the first *chedi* was built at Nakornpathom (Figure 4.29) while the *ubosot* and *wihan* are similar in design and were first built in 545 BC (Figure 4.30). The school of the established traditional Thai architecture, domestic and religious, has its root in the first Thai capital, Sukhothai (from around 1257 to 1357). However, the most influential school was design from the Ayuthaya period (from around 1357 to 1757). In this period, traditional Thai architecture started to achieve its unique characteristics especially in temples, palaces and some types of domestic architecture. According to the prototypes from the Ayuthaya period, traditional Thai temples usually have the following architectural elements as their basic requirements (Kalayanamitr, 1982):

- *Chedi* or *stupa* as the repository of Buddha's remains, personal items, inscribed philosophy or images
- *Wihan* as the hall for venerated Buddha images and as the preaching hall
- *Ubosot* together with *sema* markers as the ordination hall and the convocation chamber
- Belfry for giving signals of the commencement of religious activities (optional)
- The enlightenment tree as the symbol of Buddha's wisdom (optional)

The selected temples are built with all the basic elements configured according to different criteria. Location, land use, status, specific philosophy and the communities they are in are the additional conditions that have influenced the configuration of the temples. Of the selected temples, Wat Prachetupon (Temple 1) and Wat Yai Suwanaram (Temple 3) were built in the Ayutyaya period but their present architecture derives from renovations done in the early Rattanakosin period. Wat Suthus Thepawararam (Temple 2) was built using a concept that originated in the early Rattanakosin period. Wat Luangpo Sod Thamakayaram (Temple 4), Wat Hualumpong (Temple 5) and Wat Prathamkaya (Temple 6) were built using a contemporary concept.

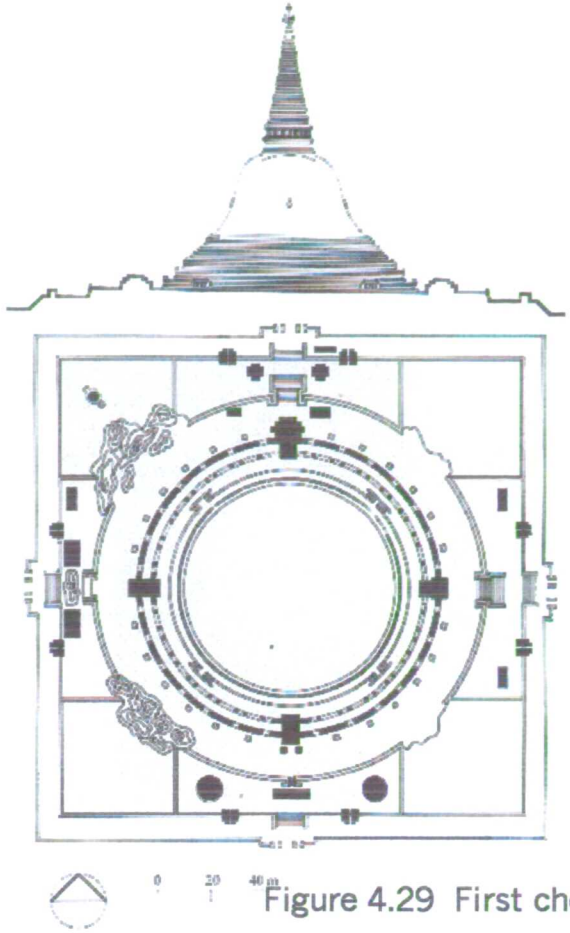


Figure 4.29 First chedi in Thailand, Nakorn Pathom

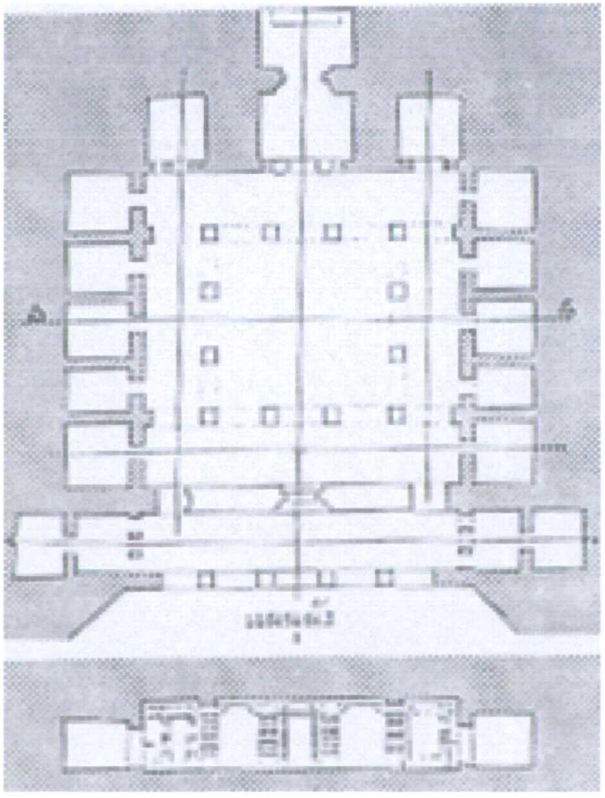
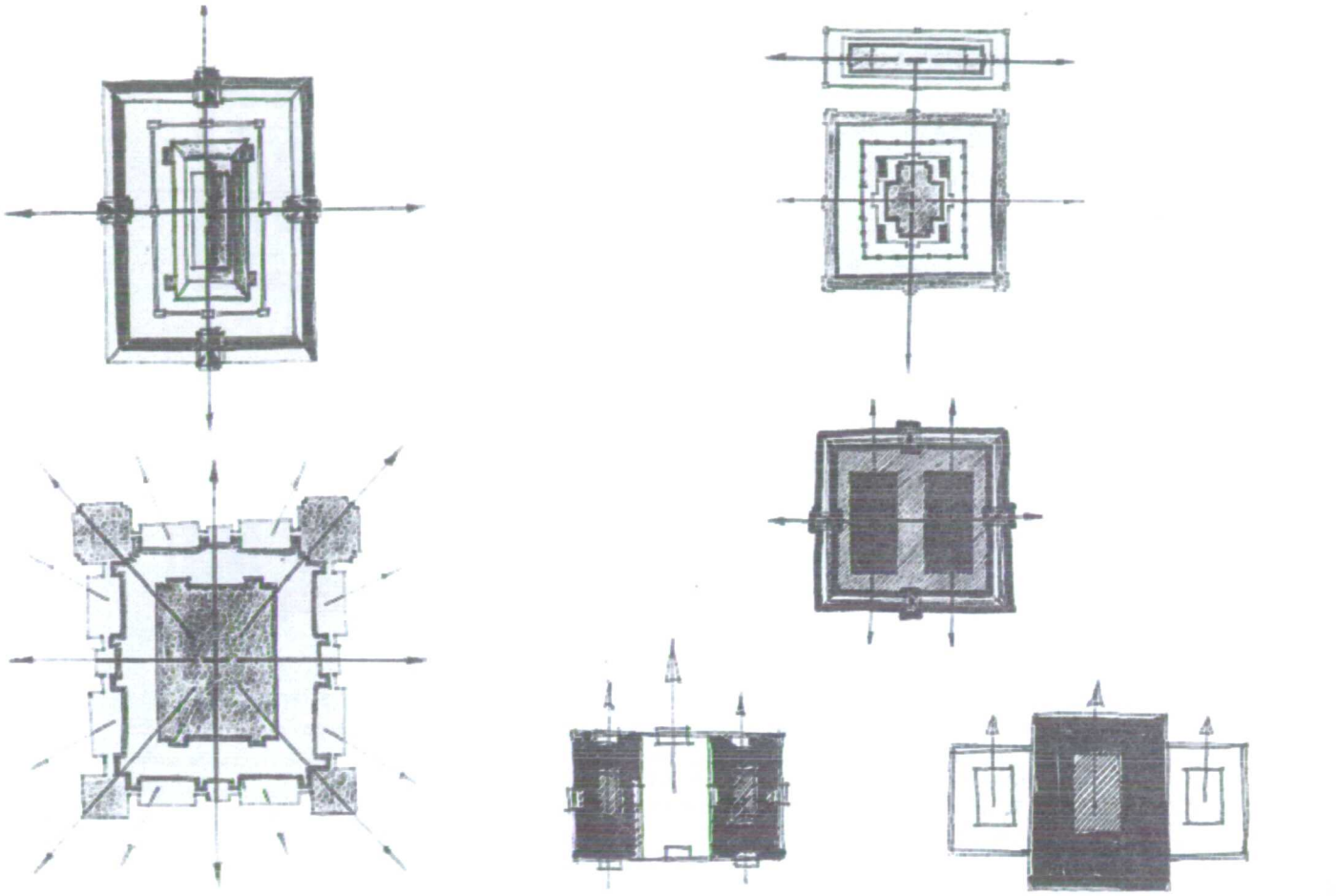


Figure 4.30 Cave temple, India (Ratanatassanee, 1996)

The traditional design of the Ayuthaya school gives most symbolic importance to the *chedi*. The *wihan* used to be a part of *chedi* before it was detached and became a hall for Buddha images. The *ubosot* was created using the same design as that of the *wihan* around the mid fifteenth century (Kalayanamitr, 1982). The *wihan* and *ubosot* are normally aligned on the same axis that is the *chedi*'s east-west axis. Among the selected examples, Wat Prachetupon (Temple 1) and Wat Yai Suwanaram (Temple 3) are among the very best representatives of this design. Despite similarities in design methods, their configurations are expressed on totally different scales; Wat Prachetupon is one of the biggest temples while Wat Yai is one of the smallest temples.

The *ubosot* became more and more important and reached its peak in the late Ayuthaya period. The tradition continued to the early Rattanakosin period as appears in Wat Prachetupon (Temple 1) where the four cardinal *wihans* are much smaller than the *ubosot* and are located as parts of the cloisters that surround the *ubosot*. The cloister unites architectural elements such as *ubosot*, *wihan* and *chedi* into one complex and thus achieves the flow and unity of functions. The cloister is used to achieve a clear-cut effect in Wat Suthus Thepwararam (Temple 2) where a cloister surrounding its *wihan* instead of its *ubosot*. The concept separates the *wihan* from the cloister and gives it an independent location that also lies on the same axis as that of the *ubosot* (Figures 4.31). The design of this temple is seen as the genuine invention of this period and established itself as an important alternative design principle for many temples designed afterwards.

From 1910 to 1950, there were very few movements in Thai temple design. On the one hand, conventional design was still used in the majority of newly-built temples in central Thailand. On the other hand, many adaptations have grown in popularity among religious communities. The most well-known movement in modern Buddhism in Thailand is the Thamakaya movement (officially started in 1978). Wat Luangpo Sod Thamakayaram (Temple 4) and Wat Prathamakaya (Temple 6) are two distinct examples of the movement. The core concept is simplicity, which means compactness and minimalism. At Wat Luangpo Sod, all the major elements except the *chedi* are presented, simplified and concise, while at Wat Prathamakaya only the *ubosot* and elevated terraces are presented.



Single axis design

Double axis design

Figure 4.31 Thai temple design (Pongrapeeporn, 1982)

Also influential in the design of new temples are economic and land-use factors. Wat Hualumpong (Temple 5) is located on one of the most expensive sites in the financial district of Bangkok. The design is again very compact but contains every major element, including two *chedis*, in its complex. However, it does not appear as a simplified object since the temple subscribes to the conventional practice of Buddhism. All three examples from the contemporary period share the same characteristic of being very compact but for different reasons. All of them are about the same size making the investigation of their architectural dimensions very interesting. The six selected temples are from Bangkok, and the provinces of Nakorn Pathom, Pathumtanee, Petchburee and Rachaburee in central Thailand (Figure 4.32).

Similar to the criteria for selecting house examples, a temple must, firstly, be a masterpiece of its kind or one that represents innovative quality in design. In the contemporary cases, the selections are described as either widely recognised or innovative in dealing with contemporary conditions. This is mainly to ensure that the data represents excellence in architectural design. Secondly, the temple must be in use and well maintained so that it is possible to understand its experiential and functional dimensions from the on-site observations. Finally, the temple must have officially secured its recognition in Buddhism and in communities, which also means that it has secured its socio-cultural interaction between the built environment and its users.

Bangkok: Houses 1, 4, 5 and 6/ Temples 1, 2 and 5
Pathumtanee: Temple 6
Nakorn Pathom: House 2
Rachaburee: Temple 4
Petchburee: House 3/ Temple 3

Figure 4.32 Central Thailand and location of the selected examples

Conventional temples

Temple 1: Wat Prachetupon, Bangkok (Figure 4.33)

-History: The temple is also known as Wat Pho. *There is no evidence as to the exact date, and by whom Wat Pho was built. But it may be assumed from supporting evidence that it is an old temple established in the late Ayuthaya Period. Perhaps Wat Pho was built after the Reign of Somdet Phra Phet Racha (B.E. 2231-2246 or 1688-1703 A.D.)... (King Rama I) had the* ubosot *erected and brought the Presiding Buddha Image... many Buddha images in various attitudes which had been moved from ancient cities in the north, were housed along the cloisters both inside and outside the* ubosot. *Wat Pho was extensively restored during the Third Reign.'* (Kanokpongchai, 1994:189)

-Size and location (Mahachanawong, 1992:50):

Conventional temple: **Temple 1**: measurement		
element	number	size (metre)
The ubosot	1	26.00 x 38.00
The ubosot with inner cloister	1	106.00 x 85.00
The ubosot with wihan and outer cloister	1	120.00 x 141.00
Total area of study = 120.00 x 141.00 metres		

Table 4.7: Measurement of temple 1

The temple is located at no. 2, Baromaharachawang, Phranakorn, in the historical district of Bangkok. The temple is located next to the Grand Palace.

-Architectural elements and functions:

The *ubosot*: ordination and preaching hall

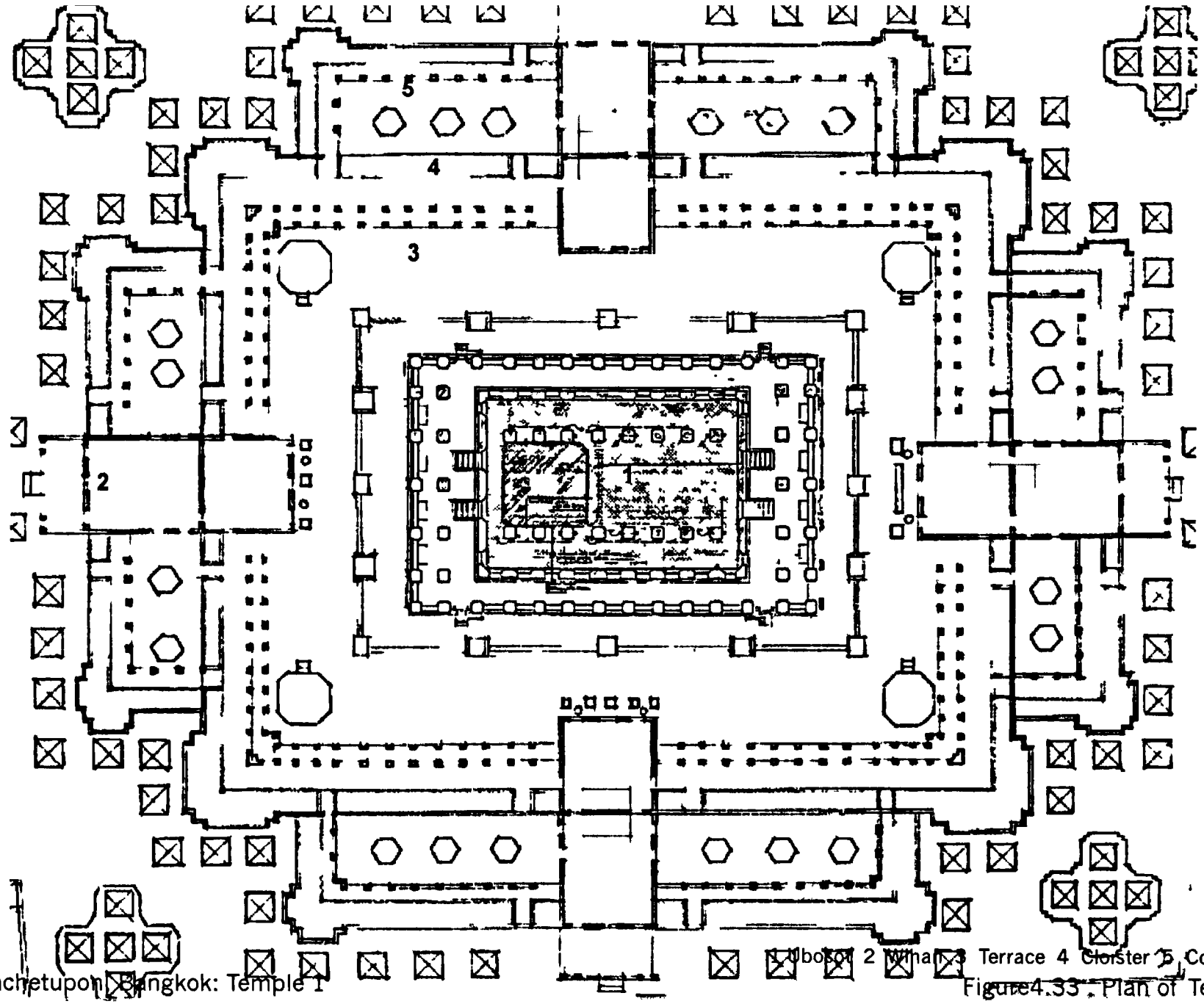
The four cardinal *wihans*: small Buddha-image halls where important Buddha images brought from temples in many provinces were housed.

The inner and outer cloisters: Buddha-image galleries where rows of Buddha images from the northern provinces are housed.

The courtyard: symbolic space with *chedis*; parts of the space are used as rest areas.

The gateway: demarcation points of entry into the sacred area.

-Occupants: The monastery has 95 monk living units (some double units included). The number of monks living in the monastery can be very different from one time to another due to different requirements in religious occasions.



1 Ubosot 2 Wihan 3 Terrace 4 Cloister 5 Courtyard

Figure4.33 : Plan of Temple 1

Wat Prachetupon, Bangkok: Temple 1

Temple 2: Wat Suthus Thepwararam, Bangkok (Figure 4.34)

-History: *'Wat Suthus Thepwararam is the temple built at the behest of King Rama I. ...at the same location as the city center. The temple was established on Monday, 1 February 2350 B.E. (1807 C.E.), ... The temple's layout was conceived by King Rama II. Construction began in the reign of King Rama I, when the foundation work of the* wihan *and pedestral for the principal image were executed, at royal command. The work was not completed. King Rama II continued with the walls of the principal* wihan,*...King Rama III completed the task, as well as construction of the* ubosot *and the monks' quarters. He performed a ritual ceremony to establish the* Sangha *communion area and celebrated the temple in 2390 B.E.'* (Paknam, 1996.182)

-Size and location (Mahachanawong, 1992:159):

Conventional temple: **Temple 2**: measurement		
element	number	size (metre)
The ubosot	1	23.00 x 72.25
The wihan	1	28.00 x 46.00
The wihan with cloister	1	150.00 x 180.00
Total area of study = 215.00 x 340.00 metres		

Table 4.8: Measurement of temple 2

The temple is located at no.146, Teethong Rd., Saochingcha, Pranakorn, Bangkok

-Architectural elements and functions:

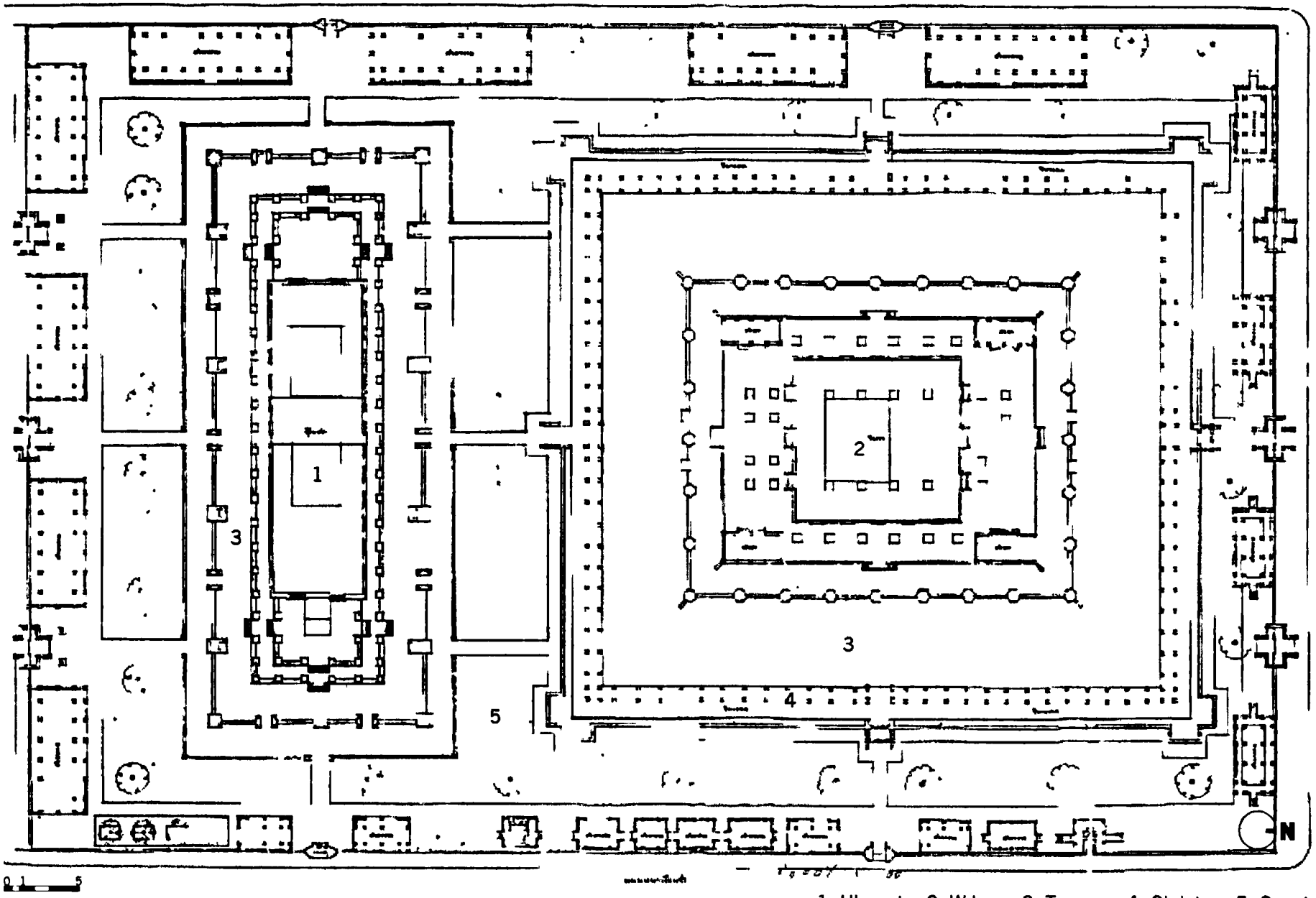
The *ubosot*: ordination and preaching hall, *'The* ubosot *houses Phra Tri Lokachet, the presiding image, and images of 80 principal disciples. ...It is considered the largest* ubosot *in Bangkok.'* (Paknam, 1996:184)

The *wihan*: Buddha image hall, Thailand biggest Buddha image, Phra Sri Sakayamuni, is housed in this *wihan*; the image was placed at the point which is believed to be the sacred centre of Bangkok.

The *sala wihan thit*: Buddha-image pavilion, there are four of them on the cardinal corners of the terrace of the principal *wihan*.

The Cloister: Buddha image gallery

-Occupants: about 300 monks in the monks' quarter at the south side of the temple.



1 Ubosot 2 Wihan 3 Terrace 4 Cloister 5 Courtyard

Figure 4.34 Plan of Temple 2

Wat Suthus, Bangkok: Temple 2

Temple 3: Wat Yai Suwanaram, Petchburee (Figure 4.35)

-History: *'Although believed to have been constructed during the Ayuthaya period, the exact date of the original construction and the builder of the wat remains unknown. This wat came to be called Wat Yai meaning a large monastery, probably because the wat had a large compound containing various big structures. Later during the reign of King Phra Chao Sua in the late Ayuthaya period, the patriarch called Taeng Mo renovated the wat. After the completion of the task, he renamed it Wat Yai Suwanaram. However, the wat is now commonly known as Wat Yai.'* (Srinuan, 1984: 39). From the first renovation, which is believed to be around 1700, the temple was renovated again during the Rama V reign at around 1909. The Fine Art Department has continuously maintained the temple ever since. (Historical Document Committee, 1983)

-Size and location (plan from Srinuan, 1984):

Conventional temple: **Temple 3**: measurement		
element	number	size (metre)
The ubosot	1	21.00 x 10.00
The cloister with wihan	1	29.00 x 40.00
The outer cloister	1	17.00 x 5.00
Total area of study = 29.00 x 40.00 + 5.00 x 17.00 (the north-outer cloister) metres		

Table 4.9: Measurement of temple 3

The temple is located on the Phongsuriya road, in Tha Rab, Muang district, Petchburee.

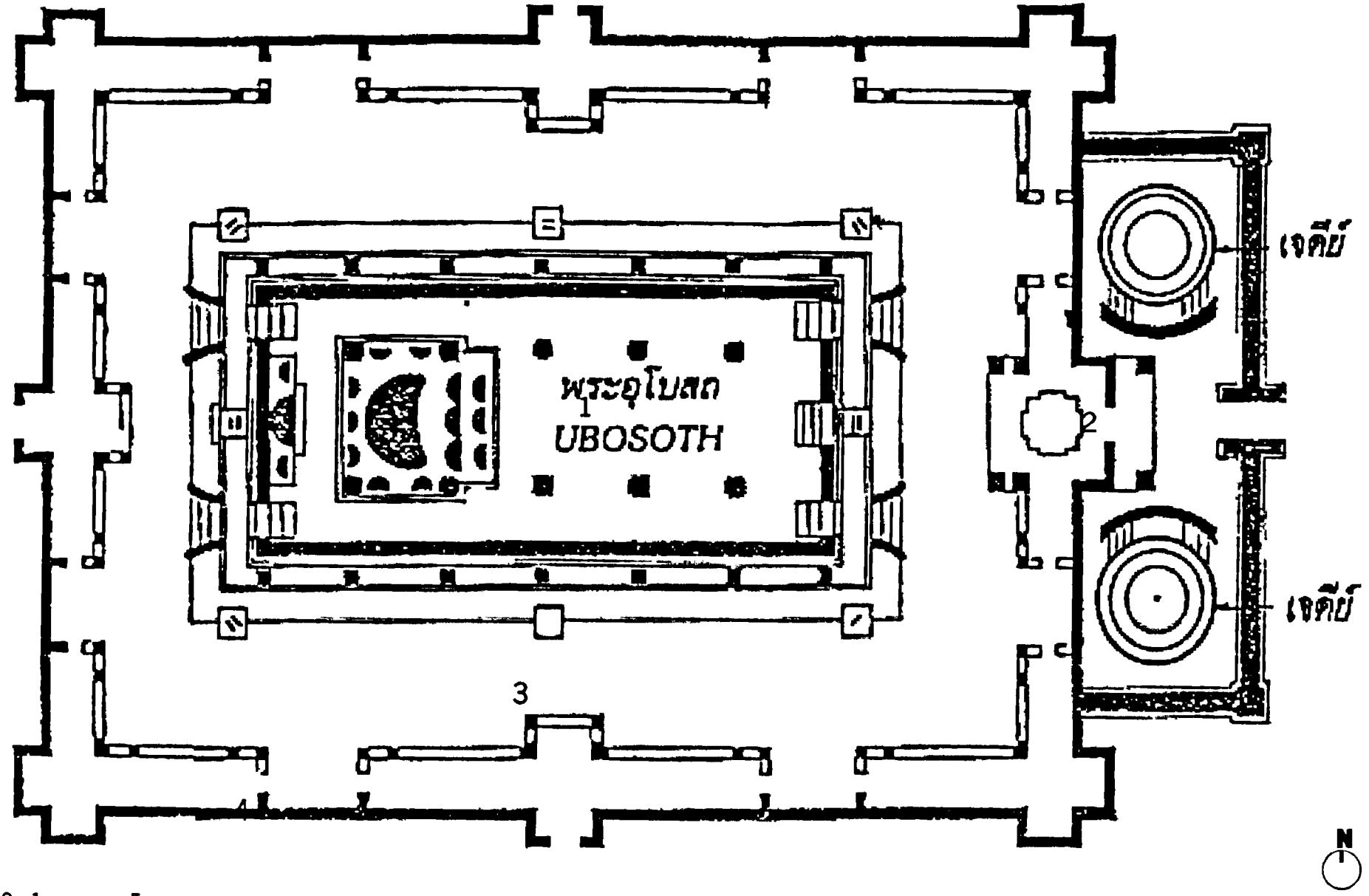
-Architectural elements and functions:

The *ubosot*: ordination and preaching hall, it houses many precious Buddha images.

The cloister with *wihan*: Buddha images gallery also houses the principal *chedi*.

The outer cloister: courtyard for two *chedis*.

-Occupants: about 20 monks in the nearby monks' compound.



1 Ubosot 2 Wihan 3 Terrace 4 Cloister 5 Chedi

Figure 4.35 Plan of Temple 3

Wat Yai Suwanaram, Petchburee: Temple 3

Contemporary temples

Temple 4: Wat Luangpo Sod Thamakayaram, Rachaburee (Figure 4.36)

-History: The temple performs a special method of meditation and practice in Buddhism called '*Thamakaya*'. Started as a foundation in 1982, it was granted the temple status in 1987 when the construction of the temple began. The temple was officially registered in November 1987 while the construction was finished in 1991. Designed by one of the most knowledgeable architects in the traditional Thai architecture, Pinyo Suwanakeeree, the temple received the 1992 'Best architecture' in religious type award from the Siamese Architects Association.

-Size and location (plan from the architect's office):

Contemporary temple: **Temple 4**: measurement		
element	number	size (metre)
The ubosot	1	7.50 x 16.00
The wihan	1	4.00 x 8.00
The pavilion	1	4.00 x 8.00
The belfry	1	6.00 x 6.00
Total area of study = 31.00 x 49.00 + 10.00 x 20.00 (belfry area) metres		

Table 4.10: Measurement of temple 4

The temple is located on Bangpae-Damnaunsaduak Road, Rachaburee province.

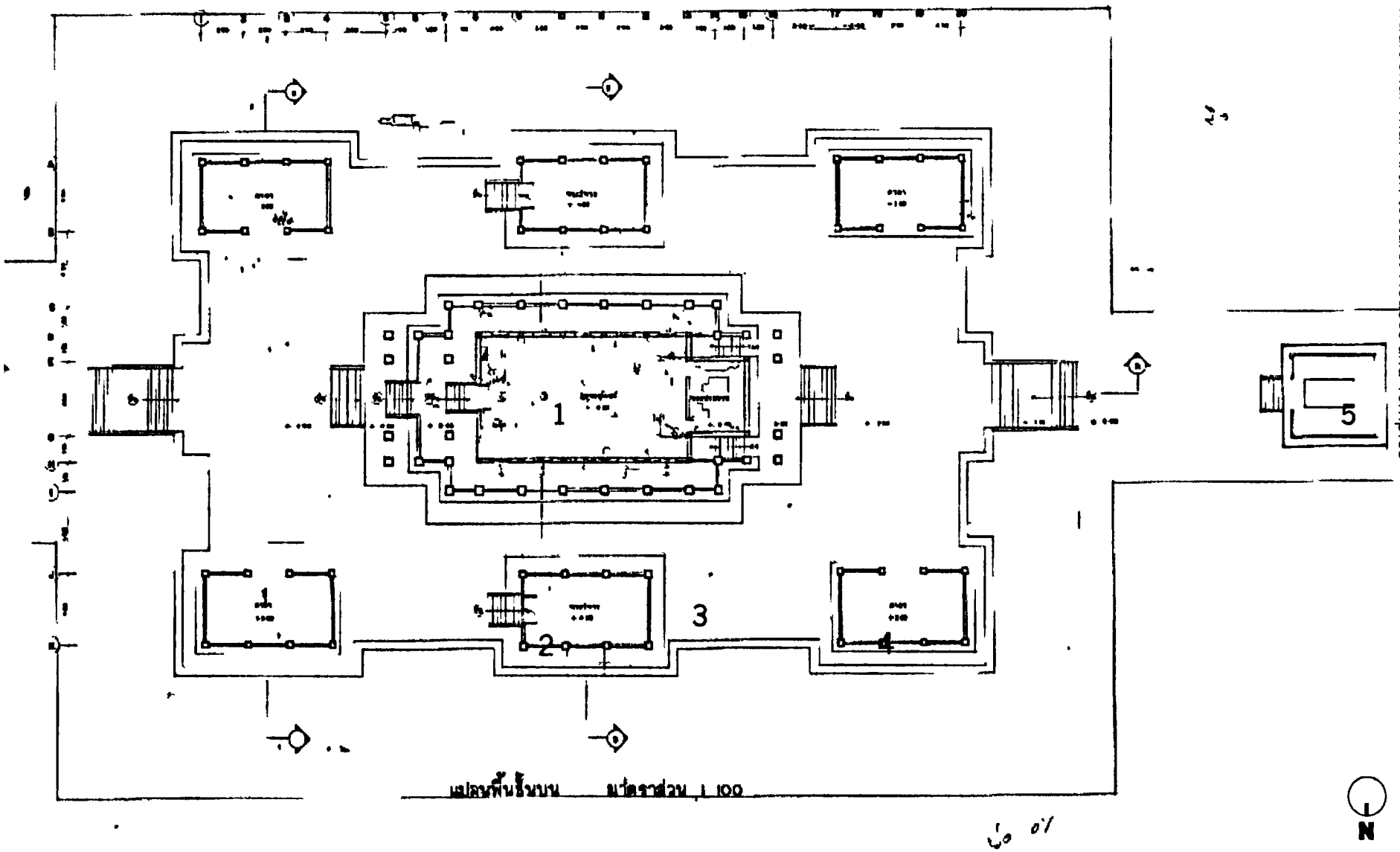
-Architectural elements and functions:

The *ubosot*: ordination and preaching hall is occasionally used as the meditation hall. It houses the presiding Buddha images.

The *wihan*: two Buddha images hall house venerated Buddha images.

The pavilion: There are four of them on the corners of *ubosot*'s terrace. It is used as a rest area, an exhibition hall, the reception hall and the office.

-Occupants: about 30 monks who permanently stay in the monastery. There are regular visitors and groups from organisations and schools.



1 Ubosot 2 Wihan 3 Terrace 4 Pavi ion 5 Belfry

Figure 4.36 Plan of Temple 4

Wat Luangpo Sod, Rachaburee: Temple 4

Temple 5: Wat Hualumpong, Bangkok (Figure 4.37)

-History: The original temple was believed to be constructed at around late 18th to early 19th century. Rama V had given the name, Wat Hualumpong, to the temple in 1904. Due to its bad condition, the old *ubosot* was replaced by the new one. The construction of the new *ubosot* began in 1993 and was finished in January 1998. At the time of the observation (February 1998), some parts of the temple such as the new *chedi* was still under construction. It is designed by Supoj Kaivithaikosol with the original conception of the temple's abbot. The temple has been fully active since January 1998.

-Size and location (plan from the architect's office):

Contemporary temple: **Temple 5**: measurement		
element	number	size (metre)
The ubosot	1	11.99 x 37.59
The chedi area	1	10.60 x 19.75
The wihan thit	4	2.15 x 2.15
The belfry area	2	1.00 x 12.10
Total area of study = 33.00 x 52.95 + 10.60 x 19.75 (belfry area) metres		

Table 4.11: Measurement of temple 5

The temple is located at no.728, Phraram 4 road, Bangrak district, Bangkok

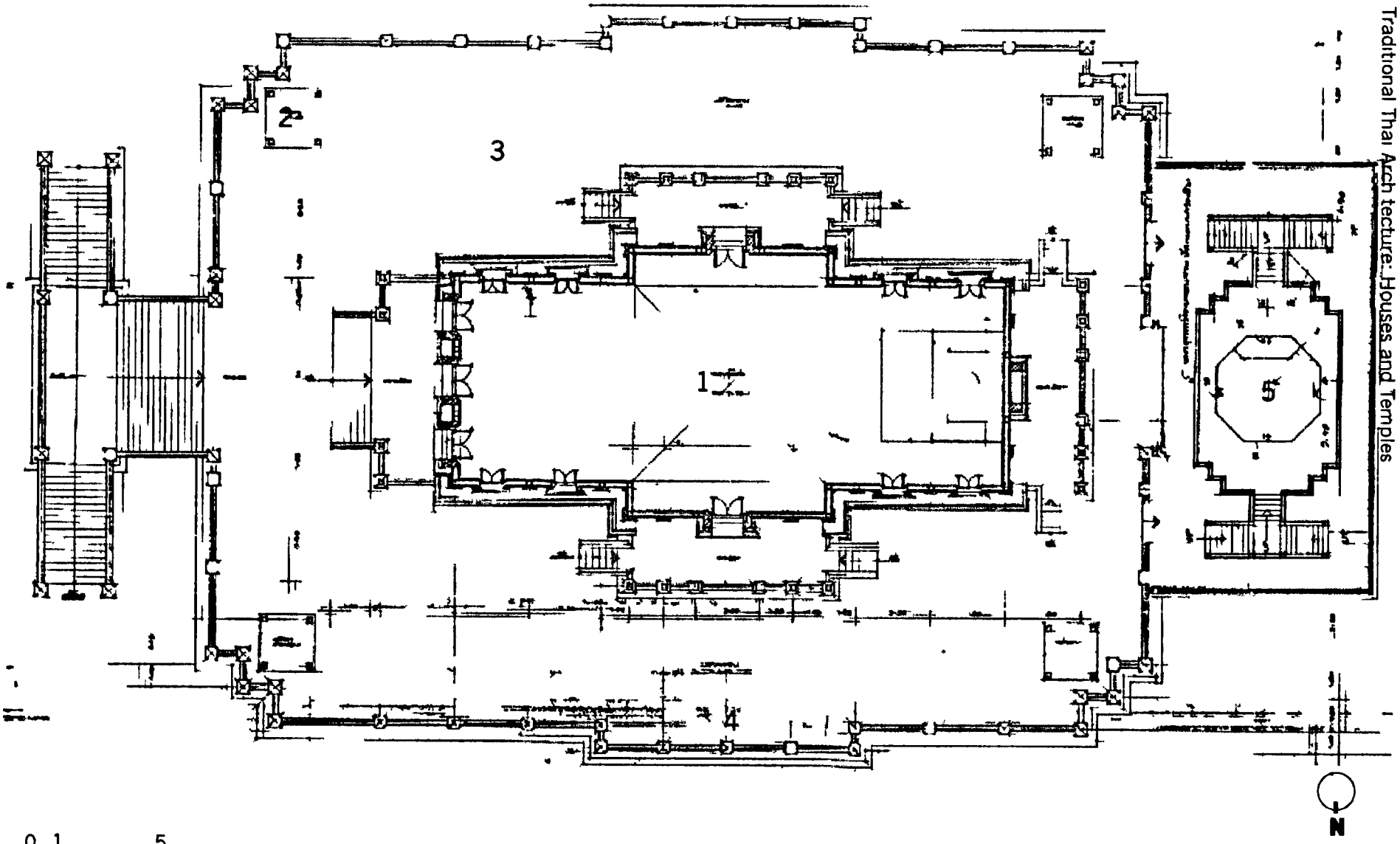
-Architectural elements and functions:

The *ubosot*: the ordination and preaching hall houses the presiding Buddha image.

The *chedi* area: the new *chedi* is being constructed and it is surrounded by a terrace.

The *wihan thit*: four-cardinal pavilions on the corners of *ubosot*'s terrace housing venerated Buddha images.

-Occupants: 20-25 monks in a modern living compound nearby.



0 1 5

1 Ubosot 2 Wihan 3 Terrace 4 Belfry 5 Chedi

Figure 4.37 Plan of Temple 5

Wat Hualumpong, Bangkok: Temple 5

Temple 6: Wat Phra Thamakaya, Pathumtanee (Figure 4.38)

-History: Another Thamakaya branch that has its own interpretation of the philosophy. In 1959, the founder of Thamakaya school died and his disciples split into competing camps. One camp became the organisation that runs Wat Luangpo Sod (Temple4). Another group founded Wat Phra Thamakaya in 1975. *'Though both camps focus on Vijja Thamakaya, the Pathumtanee faction has used modern management and marketing techniques to turn their religious group into a mass movement by successfully wooing the middle-classes.'* (Ekachai, 1999:1). Designed by Siri Sukhawalli, the temple was finished in 1981 and has become very successful attracting a large number of regular worshippers. It received the 1998 'Best architecture' in religious type award from the Association of Siamese Architects.

-Size and location (plan from the ASA):

Contemporary temple: **Temple 6**: measurement		
element	number	size (metre)
The ubosot	1	15.80 x 24.05
The ubosot and terrace	1	32.80 x 49.55
Total area of study = 32.80 x 49.55 metres		

Table 4.12: Measurement of temple 6

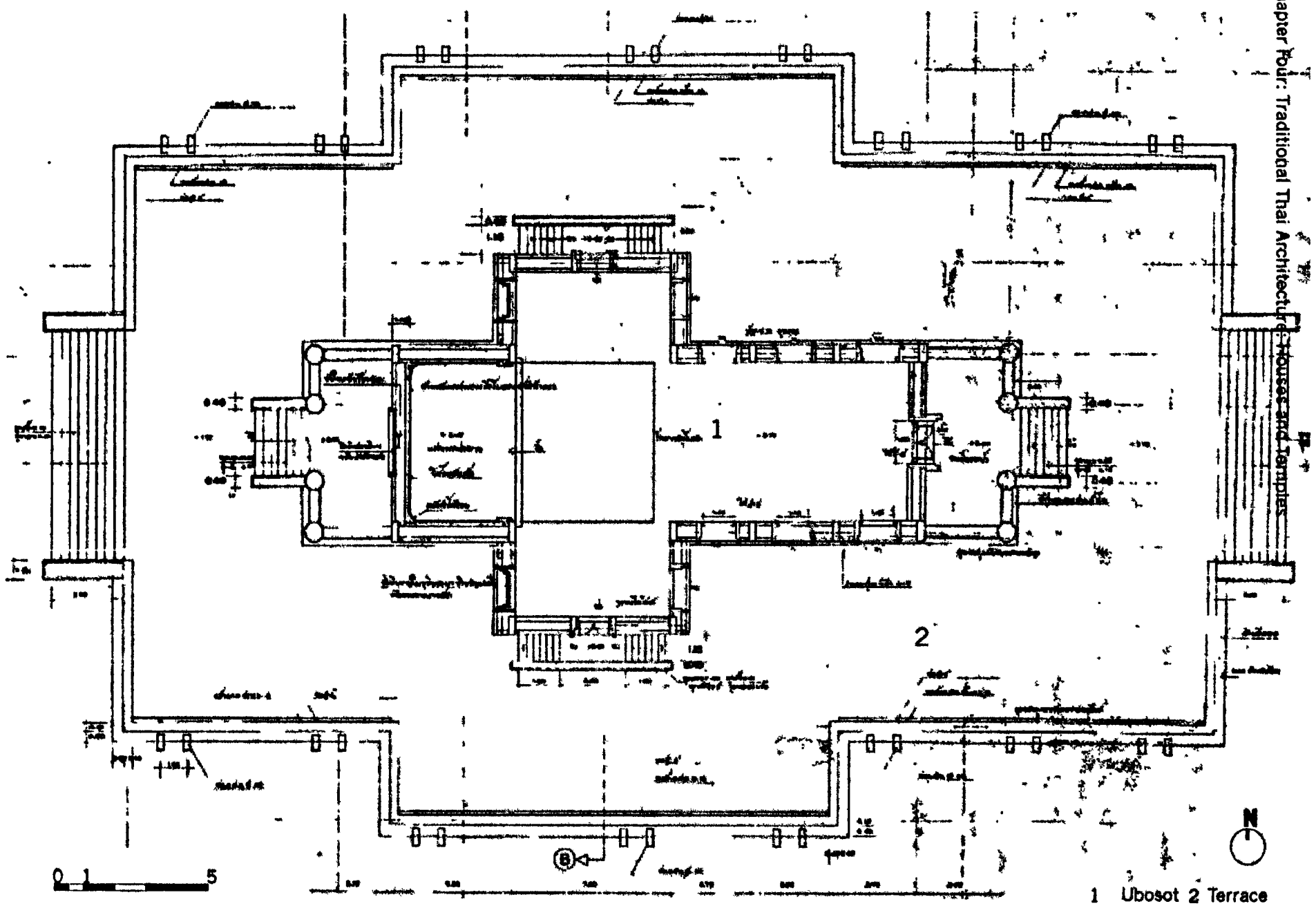
The temple is located at Klongsam, Klongluang district, Pathumtanee province

-Architectural elements and functions:

The *ubosot*: ordination and preaching hall houses the Buddha image in a new Thamakaya attitude.

-Occupants: about 881 monks and novices in various living compounds within the monastery's properties.

In the next chapter we will see in detail how these temples, and houses, can be seen as systems of spatial configuration. They can be seen separately as individuals as much as parts of the big picture of architectural space in general when we look at them in terms of relations among different dimensions that each space has. This set of six temples' space can structurally be broken down into 2375 convex spaces or 394 spaces on average.



1 Ubosot 2 Terrace

Wat Prathamakaya, Pathumtaee: Temple 6

Figure 4.38 . Plan of Temple 6

4.4 Conclusion

In conclusion, the total area of study in the selected temples ranges from about 73,100 sq. metres in Temple 2 to about 1,245 sq. metres in Temple 3. The age of the selected temples ranges from more than 300 years old in Temple 3 to just about two years old in Temple 5. For the selected houses, the area of study and the age range from about 2000 sq. metres in House 3 to about 300 sq. metres in House 6 and from more than 200 years old in House 3 to about 30 years old in House 4 and 5. The comparison between sets of temples' and houses' spaces, for example, in terms of their average number and proportion of space may provide useful information as we look into the design strategies of the buildings as a whole and thus as institutions in society in the following analyses.

This set of examples at first seems very different but they represent a real picture of traditional architecture in central Thailand. Moreover, their spatial configurations represent a well-established and coherent type of built environment that has become not only one of the strongest social institutions but also one of the most notable architectural features in Thailand. In this sense, they share more than excellent designs and surpass the limitation of scale. They represent ideal models of interaction between physical systems of objects and operational systems of people in a society. Therefore, both domestic and religious spaces are fundamental and vital to the study of relations among dimensions of space, structure-experience-function-architectural elements, which portray the oscillating procession between space and architectural reality in every society.

Consequently, the concept of selecting examples can be concluded that
1st The building is of 'established' architectural configurations; that is, the architecture has become a fully developed socio-cultural built environment of a society. As a result, the data tends to contain the basic information which represents the initial concepts of architecture in that society.
2nd The piece of architecture is in use and recognised as a functional building not as a historical object. This means that the findings from the research are the results from real use in architectural reality.
3rd At this initial stage, the excellent examples are used since they seem to offer the better information in terms of design solution. It is also better in terms of the architectural quality in objects.

This is to avoid the preoccupation of architecture as 'a concretion of other disciplines' e.g. art, knowledge, kingdom of animal, etc. In this way, the buildings' space were not necessarily designed but just used like one. These buildings have acquired their identities through use not design and thus may be less coherent in their uses and objectivity; that is, c-a-t (Eisenman, 1987) is put in a duck (Venturi, 1977) and labelled as a folly (Tschumi, 1984). There is also an indecisive conception which happens when buildings borrow many architectonic elements from the antiquities as Norberg-Schultz has pointed out (1963). Should a museum have the impression of a Greek-temple building or a train station the character of a cathedral? One has to carefully select the examples that really were originated by architectural-oriented idea in order to be able to discuss architecture as self referential objects. It often happens that most of them are classified by scholars as 'high-design' buildings. Traditional houses and temples usually surpass this 'disguise' effect as the designs are evolved from the most basic social activities.

'Buddha did not deny the gods of the popular religion, but for him they were merely individual beings which, like everything individual, are subject to the law of perishability. From them no help can come, no release from suffering, for they themselves are confined within the cycle of change and hence of suffering. In this respect Buddhism becomes a type of atheistic religion, not in the sense of denying the existence of the gods but in the far more deep-seated and radical sense that this existence is irrelevant and meaningless in the light of its central problem.' (Cassirer, 1955:247). The study of houses and temples, in the same way as Cassirer carefully put, is not the negation of special characteristics belong to types of buildings by saying that they are all influenced by houses and temples. But rather houses and temples are seen as the first and central problem in analysing architectural space since the concepts of house and temple are both un-perishable and the most stable in one society.

Furthermore, the objective of this chapter is to provide both the information and the impression of what the traditional Thai architecture is about and how it is known in relation to the general conception of architecture discussed in chapter two. It is also the introduction to some specific points that the analyses will benefit from if those points are looked at carefully in the analytical methodology as outlined in chapter three. They are the points concerning Buddhist philosophy, the concept of *Triphumikatha* and *mandala*, abstraction in social rules and customs in Thailand and how body, activities and

movement are related to different architectural elements (Figure 4.39). Together with the information from on-site observations, these points are crucial especially when interpreting and discussing design strategies which are seen as systems of relations in architectural space. With the consideration in body, space and its envelopes, the research creates the argument that exceeds particular characteristics of regionalism. At the same time, the following analyses are designed in order to avoid an over-simplified argument that may suppress various architectural possibilities and imaginations.

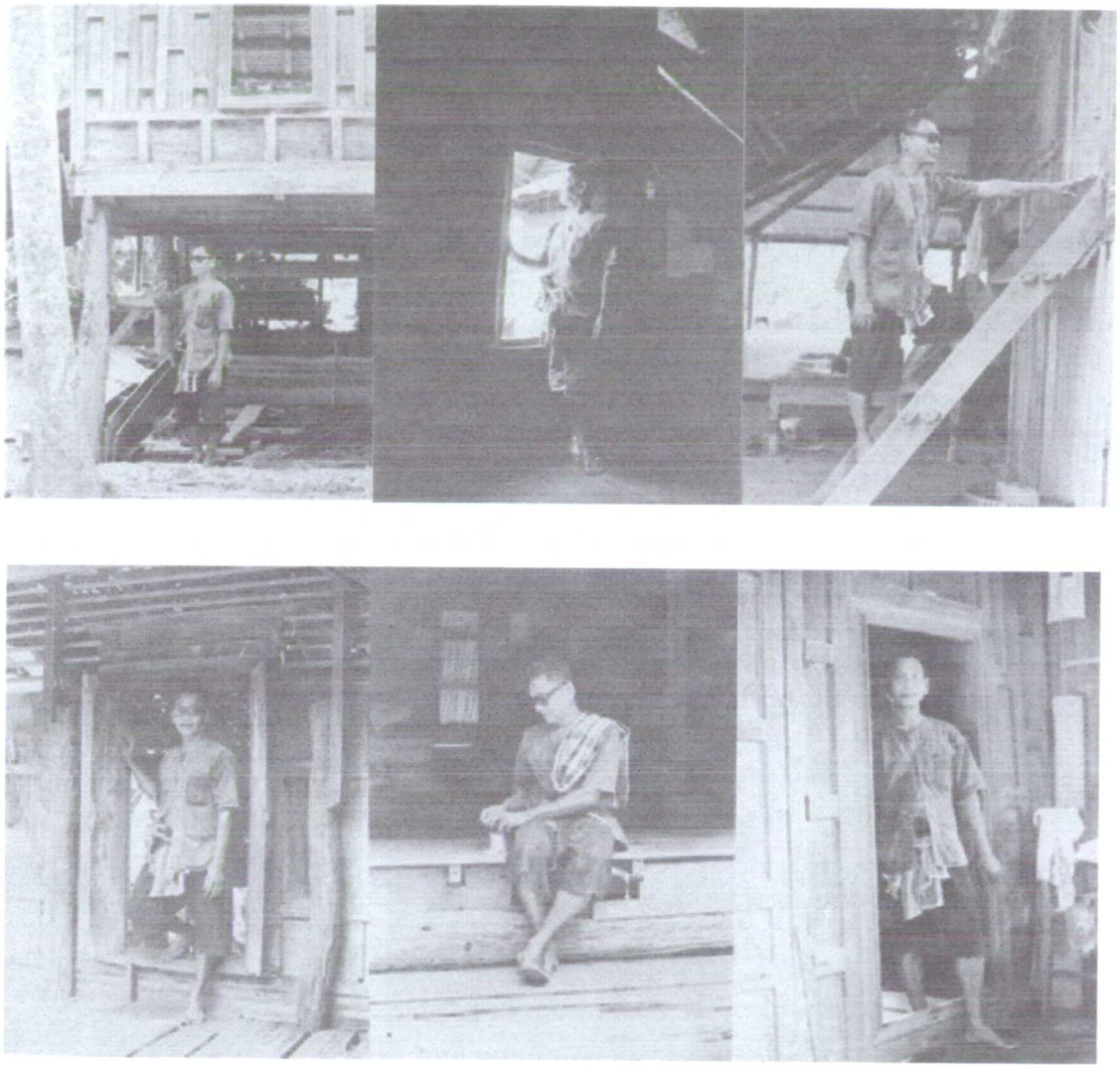


Figure 4.39 Body and Thai houses (Jaijongruk, 1975)